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ON THE COVER:

Chrysler raised the bar with the 707hp Challenger, Charger, and soon-to-be Hellcat Grand Cherokee. Which means Mopar is, once again, the target of hot rodders around the world. Larry Larson (LarsonRaceCars.net) began this twin-turbo ZL1 Camaro build before he'd ever heard of a Hellcat, but we're not above feeding that fire. Photo by Robert McGaffin.



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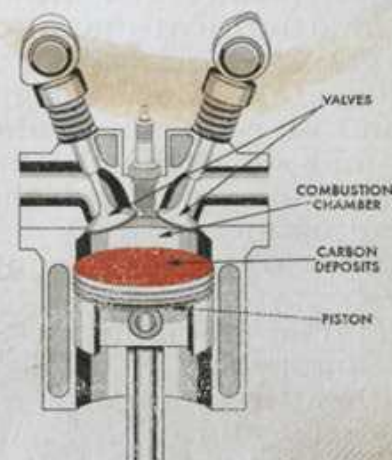


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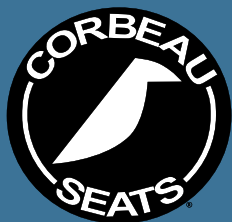
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308 Square Feet



[The car trailer might just be the most versatile "garage" I've ever found. There's zero security and protection from nature, but I've worked on a lot of projects parked behind parts stores on trailers like this.]

It's not an engine size, vehicle spec, or racetrack length, but 308 square feet is the one dimension we all share (and need) for each of our hot rods. It's a footprint that takes many forms—be it a climate-controlled showroom, a piece of oil-laced dirt behind a barn, or even the parking space in front of an apartment building. I'm talking about the physical space offered by a single-car garage. To some, it's just a parking space; to us, it's far more.

As real estate goes, there's no plot more versatile than the 14x22 feet of a hot rodder's garage. People like us use them to store cars, keep tools, and collect parts. We transform these spaces into fab shops, assembly rooms, and even paint booths. Our garages are the meeting place for our friends on Friday nights. They're where we hide our creations from the world until they're ready for the next race. They're where great ideas are born, inventions are crafted, and new speed businesses are launched. Our garages are the creative space where magic happens and all things are possible.

The wooden garage I grew up with in Massachusetts housed my father's 1963 Impala SS. As I came of age (and the SS went off to a new owner), my family's

garage held various 4x4 projects that got me through New England winters. I never parked a truck in there, mind you—I used the garage as the space to swap transmissions, repair exhaust systems, and remove rust. It was in that single-car garage that I learned to work by the light of a 60-watt drop lamp. It's where I stayed out of trouble through my teenage years, and it's where I began to practice the lessons of HOT ROD.

I can still remember the feeling of its cold concrete floor as I dropped my first oil pan and cursed my first spun rod bearing. And it's the inside of that garage I picture when I think of many of you working on your hot rods.

It's been 15 years since I've been in that garage, having swapped the cold winters and humid summers of New England for a life in California. Now I've built entire vehicles outside, in other people's shops, and even done my fair share of wrenching in parking lots and on trailers. Yes, I said trailers.

I still have nothing resembling the "dream garage" that many of us aspire to, but in reality, I don't need one. All that's required is 308 square feet and good weather to live out my dreams.

➤HOTROD.COM/**David-Kennedy**



IN MY OPINION

Great Advice
"The trouble with trouble is that it always starts out as fun."

—Anonymous

Robert E. Petersen's Automotive Museum
Our founding father, Robert E. Petersen, launched HOT ROD 67 years ago, and we continue to celebrate his vision every day. Yet there's a second branch of Petersen's legacy that's celebrating its 21st year—The Petersen Automotive Museum—and it's just finishing a complete renovation.

Beginning in December 2015, Petersen's living monument to speed, a facility located at 6060 Wilshire Boulevard in Los Angeles, will reopen after a nearly \$100 million redo. Look for updates at **Petersen.org** and we look forward to seeing you there.

➤HOTROD.COM/**Brandan-Gillogly**



Two lessons I learned simultaneously on Power Tour® 2015: 1) Camaro rear fenders are wide, forcing you to lean way out the window to shoot photos from the passenger seat; 2) It doesn't take long for a pair of glasses to fly off your face when you're shooting car-to-car photos at 70 mph.

➤HOTROD.COM/**Elana-Scherr**



I was impressed with the number of baby seats in classic cars during Power Tour® 2015. Remember it's worth it to raise the next generation of car nuts when you're trying to vacuum all the Goldfish crackers out of your seat cushions. You're heroes.

➤HOTROD.COM/**Thom-Taylor**



When you're on Power Tour®, great cars surround you, so they suddenly take a back seat and the primary focus becomes scoping out the best place to eat in each city. Maybe Power Tour® should be changed to Food Tour At Speed.

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Featured Cars | Street Rodder

Kev Elliott

May 8, 2015

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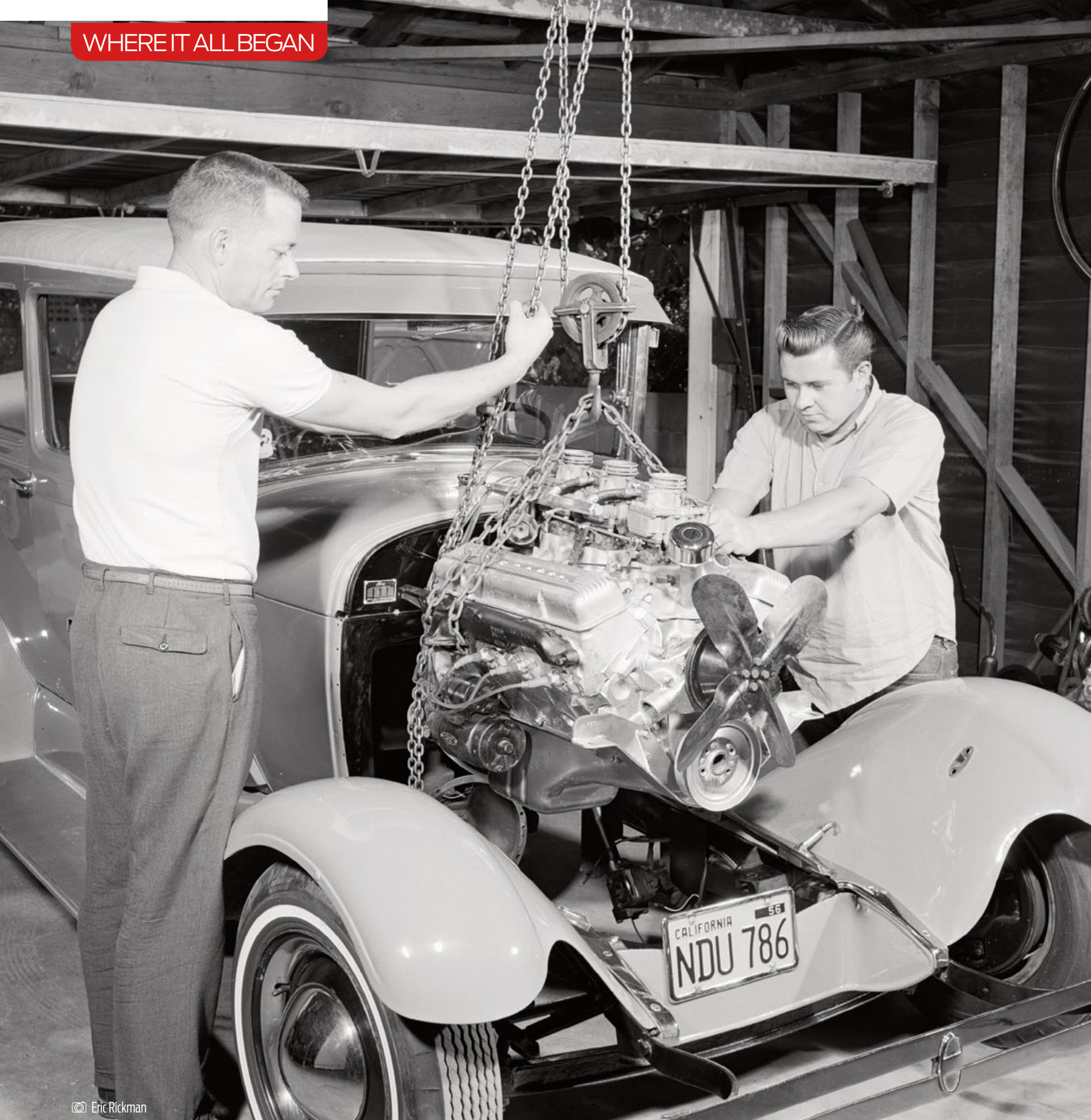
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Our One-Car-Garage Roots

For 67 years, these pages have celebrated the one-car-garage masterpieces that are the anchor for builds of all descriptions from the past, present, and future of HOT ROD. We've featured them in how-to articles, cover stories, and on the covers themselves. Though professionally built cars have become as much of a force as the homebuilt car of the 1940s to 1970s, the cars created in your spare time, with your own hands, with the help from your friends, in your garage, are still the essence of everything great about hot rodding.

This Eric Rickman shot from August 1962 of Don Grant's engine swap from Ford flathead to "modern" small-block Chevy power in his 1928 Ford Model A sedan was the basis for HOT ROD's January 1963 cover. Grant finished the swap to such perfection that he still owns the sedan today, even participating in HOT ROD's 65th anniversary Homecoming car show in Pomona, California, in 2013.

➤ HOTROD.COM/Thom-Taylor



BFGoodrich® Tires, *MOTOR TREND* and *FOUR WHEELER* invited performance driving enthusiasts to submit a short video proving he or she was indeed “driver enough” to lay down the fastest lap time behind the wheel of a 2015 Mustang GT and a 2014 Ford Raptor. Six winners were handpicked from around the country and flown out to Willow Springs International Raceway, just north of Los Angeles, to challenge themselves and each other behind the wheel. To make things even more interesting, another 50 local enthusiasts were presented with the opportunity to sign up through a microsite to partake in the event.

The Driver Enough Challenge consisted of a customized road course as well as a rough and demanding off-road track. The road course challenged participants through a series of fast straights, tight corners and a host of elevation changes. Adjacent to the road course, the rugged off-road track was designed to test the drivers’ skills behind the wheel on rough, rocky terrain.

In addition to a classroom “chalk talk,” professional driving instructors demoed the fastest lines around each respective course, and our challengers were also introduced to our celebrity BFGoodrich performance pro drivers who set baseline lap times on each course, thus setting the ultimate time to beat.

Brad Lovell has raced and won many off-road races including: Baja 1000, Ultra 4, TORC, and nearly every other off-road discipline. His on-road counterpart, Andrew Comrie-Picard, has won the North American Rally Championship, holds a string of 17 consecutive Rally America podiums and is an X Games Rally medalist.

Lovell and ACP weren’t the only two glitterati at the Driver Enough Challenge. Road racing legend

Tommy Kendall made an appearance, as did *Motor Trend’s* globetrotting Editor-in-Chief, Ed Loh. Additionally, Rick Péwé, Content Director of the *Four Wheeler* Network, offered his insight and tips for the off-road portion.

BFGoodrich® Tires took full advantage of the event to prove its tires were also up to the task at hand. The on-road course featured a group of brand-new 2015 Mustang GT’s

“CHALLENGERS WERE INTRODUCED TO OUR CELEBRITY PRO DRIVERS WHO SET BASELINE TIMES ON EACH COURSE”

fitted with g-Force™ Comp-2™ A/S tires, BFGoodrich® Tire’s best-ever, ultra-high performance all-season tire. The g-Force™ Comp-2 A/S™ rubber gave the challengers the ability to accelerate faster and brake harder in their quest for fast times.

The off-road course proved to be the perfect

setting for 2014 Ford Raptors outfitted with BFGoodrich® Tire’s All-Terrain T/A® KO2 meats. The All-Terrain T/A® KO2’s tougher sidewalls, gravel endurance and improved traction all worked wonders on the off-road course as they helped the drivers hook up and push ahead.

Once the dust settled and the track went cold, each challenger’s cumulative times and overall performance of on and off-road runs were calculated to determine our winners. Wade Koehl from Cypress, TX, came home with third, Gardner Nichols from Boulder, CO, took second place, and Mike Iler, from Redlands, CA, took home first place and won the grand prize of a new set of BFGoodrich® Tires.

Our pro drivers were astonished with Iler’s uncanny ability to lay down consistent, controlled and fast lap times, particularly as he doesn’t have any prior racing experience. Iler lapped the off-road course within a tenth of a second of Lovell’s pro lap time, and proceeded to beat the on-road pro by nearly a second!

The Driver Enough Challenge was such a success that similar events may be planned in the future. Think you’re driver enough? You might get the chance to prove it soon!



#HOTROD

Scene by Readers: Featured Artist Melanie J. Thayer.

Hailing from sunny Gilbert, Arizona, Melanie Thayer is not a professional automotive photographer. During the day, Melanie is a drug inspector for the Arizona State Board of Pharmacy, but in her free time she shoots photos of old cars and enjoys wrenching on them with her husband.

As a teenager, she used to cruise Highway 100 in Milwaukee with her friends, and since then, she has continued her love of car culture by attending shows, cruises, and drag races, both locally and out of state. The current owner of a 1928 Ford roadster and a 1954 Chevy cabover (COE) truck, Melanie says her love for hot rodding fueled her to become a photographer.

Melanie gravitates toward classic cars in general, regardless of their condition. So how does she take such great shots? "Be patient and wait for 'that shot,' even if that means telling your friends to get the heck out of your way."

Want to see more of Melanie's work? Follow her on Instagram: @rsb_rodner13_mel.

➤ **Albert Hernandez**

01] Melanie's favorite shot of her family's 1928 Ford Roadster pickup is at an abandoned store in Arizona.

02] It isn't only the cars that captivate Melanie to take photos: "[The Firestone whitewall] looked cool and weathered."

03] With ominous but beautiful scenery, Melanie shot her friend's 1951 Dodge Wayfarer called #51StreetSweeper.

INSTAGRAM NAME	@rsb_rodner13_mel
CAMERA	Canon PowerShot SX30 IS
FAVORITE FILTER	Melanie does not use filters for the most part, but once in a while she likes to get a little creative and uses Snapseed.
BEST TIP	Consider the background because it can make all the difference in the perfect shot.
CURRENT CARS	Her dream truck is her 1954 Chevy COE.



SEND YOUR PHOTOS

Do you have a collection of awesome car photography? Tips on how to take better shots? If you or someone you know should be featured in #HOTROD, let us know at HOTROD@HotRod.com or tag us on Instagram or Twitter @hotrodmagazine.



HARBOR FREIGHT

QUALITY TOOLS AT RIDICULOUSLY LOW PRICES

QUALITY TOOLS

SUPER COUPON

27 LED PORTABLE WORKLIGHT/FLASHLIGHT
LOT 67227 shown
69567/60566/62532



SAVE 62%

\$299 REG. PRICE \$7.99

Batteries included.

27411545

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SUPER COUPON

MOVER'S DOLLY
HaulMaster
LOT 60497/61899
62399/93888 shown



1000 lb. Capacity

\$899 REG. PRICE \$14.99

SAVE 40%

27377969

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SUPER COUPON

SAVE \$50

CHICAGO ELECTRIC

90 AMP FLUX WIRE WELDER
LOT 61849/62719
68887 shown



No Gas Required

\$9999 REG. PRICE \$149.99

WE CARRY A FULL LINE OF WELDING WIRE

27432747

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SUPER COUPON

PITTSBURGH AUTOMOTIVE

3 TON HEAVY DUTY STEEL JACK STANDS
LOT 38846 shown
69597/61196/62392



SAVE 55%

\$1999 REG. PRICE \$44.99

27427198

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SUPER COUPON

SAVE \$160

LOT 62443
68751 shown



45 WATT SOLAR PANEL KIT

\$13999 REG. PRICE \$299.99

THUNDERBOLT MAGNUM solar

27347847

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SUPER COUPON

20% OFF

ANY SINGLE ITEM

27358328

LIMIT 1 - Save 20% on any one item purchased at our stores or HarborFreight.com or by calling 800-423-2567. *Cannot be used with other discount, coupon, gift cards, Inside Track Club membership, extended service plans or on any of the following: compressors, generators, tool storage or carts, welders, floor jacks, Towable Ride-On Trencher, Saw Mill (Item 61712/62366/67138), Predator Gas Power Items, open box items, in-store event or parking lot sale items. Not valid on prior purchases after 30 days from original purchase date with original receipt. Non-transferable. Original coupon must be presented. Valid through 12/7/15. Limit one coupon per customer per day.

27358328

WOW SUPER COUPON

3 GALLON, 100 PSI OILLESS HOT DOG STYLE AIR COMPRESSOR
LOT 69269/97080 shown



CENTRAL PNEUMATIC

\$3999 REG. PRICE \$89.99

SAVE 55%

27345995

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SUPER COUPON

US*GENERAL PRO

30", 5 DRAWER TOOL CART
LOT 69397
61427
95272 shown



704 lb. Capacity

\$16999 REG. PRICE \$349.99

27426738

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SUPER COUPON

SAVE 66%

6" SELF-VACUUMING AIR PALM SANDER
CENTRALPNEUMATIC



LOT 60628
98895 shown

\$1999 REG. PRICE \$59.99

27387077

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WOW SUPER COUPON

"Impressive Accuracy, Amazing Value" - Car Craft Magazine

TORQUE WRENCHES

PITTSBURGH PRO

1/4" DRIVE
LOT 2696/61277

3/8" DRIVE
LOT 807/61276

1/2" DRIVE
LOT 62431
239 shown



SAVE 60%

YOUR CHOICE!

\$1199 REG. PRICE \$29.99

• Accuracy within ±4%

27354847

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SUPER COUPON

HARDY NEW

MECHANIC'S GLOVES

MEDIUM LOT 62434 62426

LARGE LOT 62433 62428

X-LARGE LOT 62432 62429 shown



SAVE 60%

YOUR CHOICE!

\$399 REG. PRICE \$9.99

27355616

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SUPER COUPON

PITTSBURGH AUTOMOTIVE

2 TON FOLDABLE SHOP CRANE
LOT 60388
69514 shown



\$17999 REG. PRICE \$229.99

SAVE \$120

• Includes Ram, Hook and Chain

27362578

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WOW SUPER COUPON

RAPID PUMP® 1.5 TON ALUMINUM RACING JACK
PITTSBURGH AUTOMOTIVE



• 3-1/2 Pumps Lifts Most Vehicles
• Weighs 27 lbs.

LOT 69252
60569/62160
62496/62516
68053 shown

SAVE \$60

\$5999 REG. PRICE \$119.99

27366078

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SUPER COUPON

6" VARIABLE SPEED DUAL ACTION POLISHER
CHICAGO ELECTRIC POWER TOOLS



SAVE \$72

NEW

LOT 62403
69924 shown

\$5799 REG. PRICE \$129.99

27379265

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SUPER COUPON

NEW

900 PEAK/ 700 RUNNING WATTS 2 HP (63 CC) 2 CYCLE GAS RECREATIONAL GENERATOR



LOT 69381 shown
66619/60338/62472

\$9999 REG. PRICE \$179.99

SAVE \$80

27431418

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SUPER COUPON

SAVE \$45

20 GALLON PARTS WASHER WITH GENERAL PURPOSE PUMP
LOT 60769/94702/7340 shown



\$8499 REG. PRICE \$129.99

27433809

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600 Stores
Nationwide

WOW SUPER COUPON

Customer Rating
★★★★★

44", 13 DRAWER INDUSTRIAL QUALITY ROLLER CABINET
US★GENERAL PRO
• Weighs 245 lbs.
LOT 68784 shown
69387/62270
62591/62744

SAVE \$330
\$369⁹⁹ REG. PRICE \$699.99

AWARD WINNING QUALITY

LIMIT 3 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 12/7/15. Limit one coupon per customer per day.

27528810

WOW SUPER COUPON

FREE
WITH ANY PURCHASE
PITTSBURGH
1" x 25 FT. TAPE MEASURE
LOT 69080 shown
69030/69031/47737

\$6⁹⁹ VALUE

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 12/7/15. Limit one FREE GIFT coupon per customer per day.

27538189

WOW SUPER COUPON

1/2" INDUSTRIAL QUALITY SUPER HIGH TORQUE IMPACT WRENCH
• 700 ft. lbs. Max. Torque
LOT 62627
68424 shown

SAVE \$55
\$74⁹⁹ REG. PRICE \$129.99

CENTRAL PNEUMATIC

27447044

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WOW SUPER COUPON

2 PIECE VEHICLE WHEEL DOLLIES
• 1500 lb. Capacity
LOT 60343
67338 shown

SAVE 37%
\$49⁹⁹ REG. PRICE \$79.99

PITTSBURGH AUTOMOTIVE

27498383

LIMIT 5 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 12/7/15. Limit one coupon per customer per day.

WOW SUPER COUPON

5 PIECE PLIERS SET
LOT 69352/69351 shown
69353/62597/62598

PITTSBURGH

SAVE 55%
\$8⁹⁹ REG. PRICE \$19.99

10" 8" 8" 6"

27477371

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WOW SUPER COUPON

NEW
29 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL DRILL BIT SET
LOT 5889/62281/61637 shown

SAVE 60%
\$9⁹⁹ REG. PRICE \$24.99

WARRIOR

27523188

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WOW SUPER COUPON

12 TON SHOP PRESS
CENTRAL MACHINERY
• Pair of Arbor Plates Included

SAVE \$100
LOT 33497/60604 shown
\$99⁹⁹ REG. PRICE \$199.99

27529611

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WOW SUPER COUPON

10 FT. x 20 FT. PORTABLE CAR CANOPY
LOT 60728
69034 shown

SAVE OVER \$90
\$109⁸⁸ REG. PRICE \$199.99
\$149⁹⁹

HFT

27437501

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WOW SUPER COUPON

MECHANIC'S SHOP TOWELS
PACK OF 50
LOT 46163 shown
68442/69649
61878/61837

SAVE 50%
\$9⁹⁹ REG. PRICE \$19.99
\$12⁹⁹

HFT

27488010

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WOW SUPER COUPON

4-1/2" ANGLE GRINDER
drillmaster
LOT 60625 shown
95578/69645

SAVE 50%
\$9⁹⁹ REG. PRICE \$19.99

27499087

LIMIT 7 - Good at our stores or HarborFreight.com or by calling 800-423-2567. Cannot be used with other discount or coupon or prior purchases after 30 days from original purchase with original receipt. Offer good while supplies last. Non-transferable. Original coupon must be presented. Valid through 12/7/15. Limit one coupon per customer per day.

WOW SUPER COUPON

PITTSBURGH AUTOMOTIVE
2000 LB. FOLDABLE ENGINE STAND
LOT 69522 shown
69521/67015

SAVE \$50
\$109⁹⁹ REG. PRICE \$159.99

27512598

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WOW SUPER COUPON

SAVE \$160
110 LB. PRESSURIZED ABRASIVE BLASTER
LOT 69724/95014
60696 shown

\$89⁹⁹ REG. PRICE \$249.99

CENTRAL PNEUMATIC

27513113

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WOW SUPER COUPON

NEW
CENTRAL PNEUMATIC
20 OZ. PROFESSIONAL HVLP GRAVITY FEED AIR SPRAY GUN (600 CC)
LOT 68843

SAVE 40%
\$47⁹⁹ REG. PRICE \$79.99

27438112

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WOW SUPER COUPON

RETRACTABLE AIR HOSE REEL WITH 3/8" x 50 FT. HOSE
LOT 93897 shown
69265/62344

SAVE \$90
\$59⁹⁹ REG. PRICE \$149.99

CENTRAL PNEUMATIC

27447429

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WOW SUPER COUPON

SAVE \$400
PITTSBURGH MOTORCYCLE
1000 LB. CAPACITY MOTORCYCLE LIFT
• Height Range: 7" - 30"

LOT 69904
68892 shown
\$299⁹⁹ REG. PRICE \$699.99

27479243

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WOW SUPER COUPON

CENTECH
AUTOMATIC BATTERY FLOAT CHARGER
LOT 42292 shown
69594/69955

SAVE 70%
\$5⁹⁹ REG. PRICE \$19.99

27538859

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Hot Rod Anything! Matix Skateboard



[Turkey Stopnik, a Matix Clothing team rider, is performing a frontside air at Matix's ramp facility. HOT ROD General Manager Jeff Dahlin skated the ramp, too, and sprained his ankle pretty good during this photo shoot.]



► Both sets of trucks are made by Independent Truck Company. The set on the left is made from forged titanium—a new technology for the skateboarding market—that allows for a much lighter and stronger truck. Within the titanium trucks, the kingpin bolt, which holds the entire truck assembly together with a urethane bushing, has been gun-drilled for even more weight savings.

► The bearings are from Bones Bearings, a high-end bearing used by skateboarders for more than 33 years. Bearings for industrial use are assigned an ABEC (Annular Bearing Engineers Committee) rating; the higher the ABEC rating, the higher the tolerances are, making the bearing a more precision part. Bones Swiss bearings go beyond an ABEC rating because skateboarding puts incredible pressure on the bearings themselves, due to the dimensions of the skate components, geometry, side-loading forces, impacts, and environment. Most skating takes place with the bearings spinning at no more than 4,700 rpm (which translates to about 30 mph on a 54mm wheel).



Skateboarding and hot rodding both came of age in Southern California and served as the first foray into speed for several HOT ROD

staffers, so when Matix Clothing began producing HOT ROD-licensed gear, which just went on sale at surf and skate shops nationwide, this custom

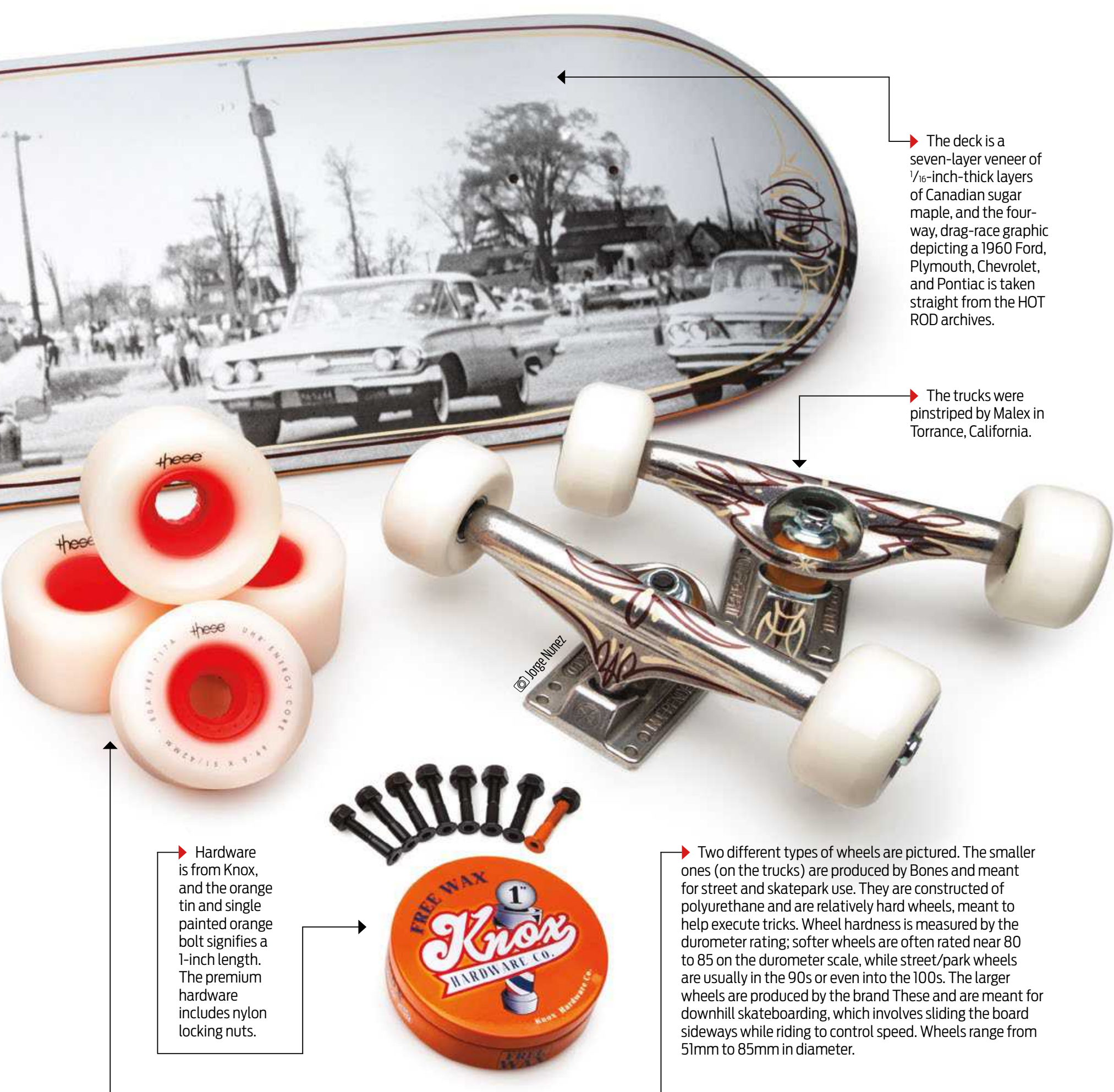
deck was a natural. Just like a hot rod, building the right skateboard means selecting the right components for both performance and appearance.

Take a look at some of the uniquely engineered parts we picked for our HOT ROD board.

► Jeff Dahlin

DO YOU HOT ROD EVERYTHING?

If you've hopped up anything that's not a car, let's see it! Hot leaf blower? Bitchin' gas grill? Customized kitchen cabinets? Anything goes. Email pics and details: HOTROD@HotRod.com.



Readers' Projects

Want to share your car with the whole world? Send photos and info to HOTROD@HotRod.com.



Dave & Karen Ladanyi // Taylor, Michigan

Initially purchased as a shell, Dave and Karen's immaculate 1965 Chevelle Malibu is now powered by a 383 Stroker backed by a TH350 transmission.



Noah Welch // Urbandale, Iowa

This 1964 1/2 Mustang is coated with an original Prairie Bronze paint scheme, rolls on rally wheels, and is a complete rotisserie restoration.

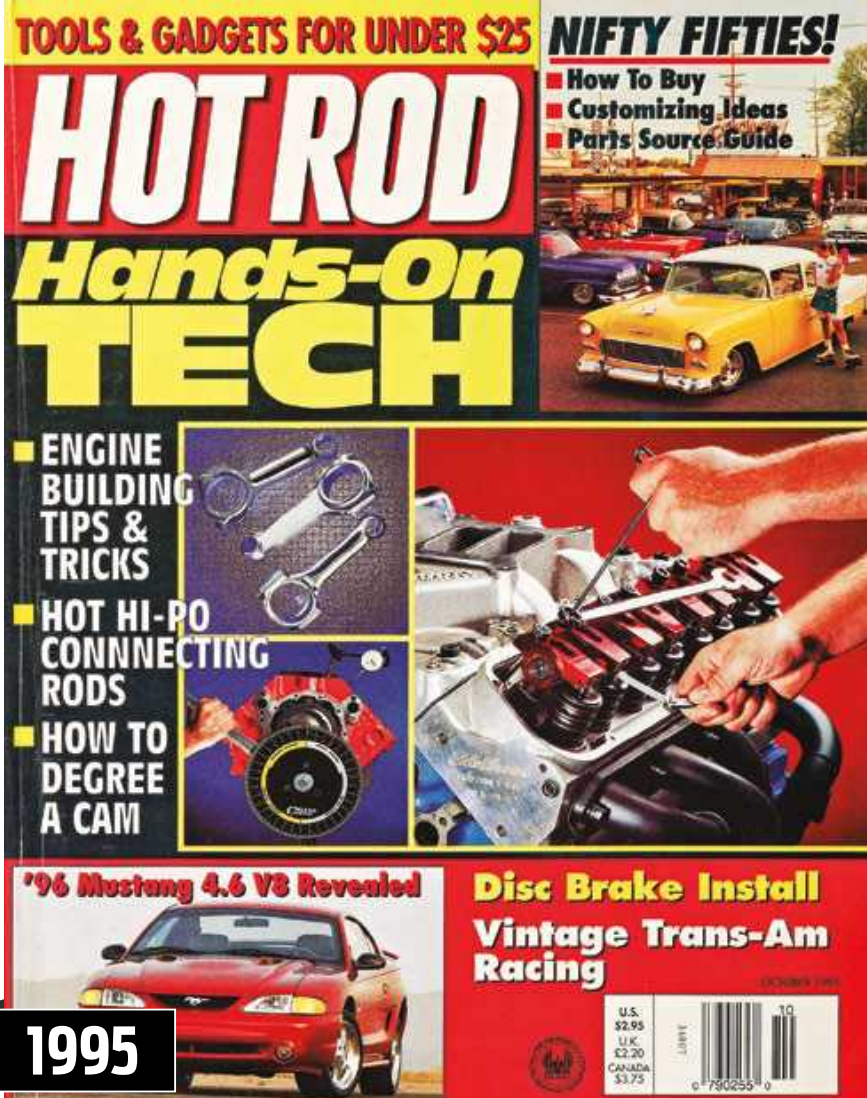
The Petersen Archives



1975



1955



1995

20 YEARS AGO

October 1995 (124 pages, \$2.95): Then as now, technical articles help move magazines and aftermarket products off of shelves, pleasing circulation directors and advertisers. Notice the dominant word here: “Tech” is nearly as large as our logo. Low-buck stuff (“Under \$25”) always appeals. Extra points are awarded for “Hands-On,” “Tips & Tricks,” “Tools,” and “How To” (twice!). Blurbs alone do not a magazine make, of course; any editor who fails to back them up with solid information will soon drop down a notch in the masthead. Editor Drew Hardin delivered on all counts here, plus contributed a strong tech story of his own about the “mod motor” about to displace Mustang’s trusty pushrod 302.

40 YEARS AGO

October 1975 (122 pages, \$1): Motorsports dominated this package, beginning with Gray Baskerville’s photo of a C/Altered Anglia powered by a 315ci Chevy and described inside as “a 1975 Pro Stocker cleverly disguised to look like a 1950 Anglia ... [which] has to be the lowest and costliest (\$22,000 invested) ever built.” Event coverage ranged from off-road action in Mexico and drag boating in Long Beach, California, to a historic Summernationals in Englishtown, New Jersey. Fuel-car champions Jim Bucher and “Jungle” Jim Liberman each earned his first—and last—NHRA national-event victory here. Bucher’s stunning upset also endures as the only major NHRA win for a Chevy-powered Top Fuel.

60 YEARS AGO

October 1955 (68 pages, 25¢): There’s no overestimating the impact this cover had on hot rodding. Modified roadster pickups were nothing new, but Norm Grabowski single-handedly launched the T-bucket craze by radically shortening a 1922 Ford Touring body and Model A box to channel over a Model A frame sectioned 20 inches at the rear and lengthened 6 inches up front. Hundreds of copies would be built in the late-1950s by viewers of 77 *Sunset Strip*, a hit series casting the repainted roadster as costar Edd “Kookie” Burns’ regular ride.

» Dave Wallace

GV GEAR VENDORS
UNDER/OVERDRIVE

PRESENTS

HOT ROD DRAG WEEK[®] 15



COME SEE THE FASTEST STREET CARS IN THE WORLD!

THIS AIN'T TV — THIS IS LEGIT

HOT ROD Drag Week[®] is where your car better be faster than your mouth! Street-legal drag racers run five quarter-mile events in five days at four different tracks, driving their cars 1,000-plus miles along the way. For 2015, you can come watch every day, from tech inspection through the all-hangin'-out, heads-up finale. See Drag Week's quickest stars like Jeff Lutz, Larry Larson, Doug Cline, and Tom Bailey and their 6-second, 200-mph rides. Drag Week[™] also offers many classes for down-and-dirty muscle cars from all over the world.



SEE THE BATTLE FOR 5 SECONDS, 5 DAYS IN A ROW!

TECH DAY

Sunday, 9/13

**Gateway
Motorsports
Park**

Madison, IL

- Gates open 9:00 am
- Tech until 5:00 pm
- Tune from 6:00 pm until 8:00 pm
- Tickets: \$15 for 13 and above/Children 12 and under free

RACE DAY

Monday, 9/14

**Gateway
Motorsports
Park**

Madison, IL

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Tuesday, 9/15

**Lucas
Oil
Raceway**

Indianapolis, IN

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Wednesday, 9/16

**Great
Lakes
Dragaway**

Union Grove, WI

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Thursday, 9/17

**Cordova
International
Raceway**

Cordova, IL

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

FINALS

Friday, 9/18

**Gateway
Motorsports
Park**

Madison, IL

- Gates open 11:00 am
- Racing from 2:30 pm to 8:30 pm or until complete
- Tickets: \$15 for 13 and above/Children 12 and under free

HEADS-UP!

Saturday, 9/19

**Gateway
Motorsports
Park**

Madison, IL

- Gates open 9:00 am
- Racing from 11:00 am to 3:30 pm or until complete
- Tickets: \$15 for 13 and above/Children 12 and under free

LEARN MORE AND CATCH ALL THE COVERAGE AT HOTROD.COM

Automotive Archaeology

Road Runner Rescued By a Ford

© Ryan Brutt

While in Detroit visiting friends, I convinced two buddies to go for a drive in search of forgotten cars. We took the scenic route north out of the city and cruised around until we spotted a 1968 Road Runner being pulled from a garage by an old Ford farm tractor. Naturally, we had to stop and check it out.

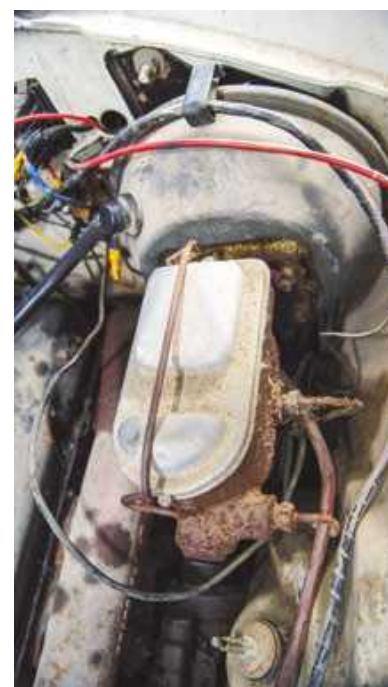
The car's owner was happy to talk with us about the bird. The Mopar had been sitting for decades, and a guy had just offered to buy the car from him. With no immediate plans for the Road Runner himself, he sold it.

The car was a pretty neat piece, a 1968 Road Runner

hardtop with a 383 and automatic shifter on the column—1 of 8,480 produced with that combo for the first year of the redesigned B-body. The original color combination was striking, too: a white car with blue interior. But perhaps the coolest part of the car was that it had air conditioning.

The current owner told us if we had been a few minutes earlier (or an hour or so later), we would never have seen the car. The next owner was planning on coming over to pick the car up soon. Even when parked for years, barn-find Road Runners can still move quickly.

► Ryan Brutt



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The all new Auto Meter GPS Speedometers never require calibration. Configurable Rally Nav display shows odometer, trip odometer, time/date, GPS coordinates, heading info, compass, and peak speed recall. Our lightning fast omni-directional antenna is included and **no external modules** are used. Quite simply, the easiest, most accurate speedometer available

Customizable through the:



ampcustomshop.com



www.autometer.com

Gutted For Glory

A Brand-New **ZL1 Camaro**
Is Completely Torn Down
For Drag Week Gold



✍ Thom Taylor 📷 Robert McGaffin

► Look, let's just get this out of the way right up front. What Tom McGilton did to his brand-new ZL1 Camaro is crazy. When the local Kansas City Chevy dealer, Van Chevrolet, told Tom it was getting a 2013 ZL1, he bought it. Says Tom, "When I told the salesman what my plan was for the car, he wanted me to give [it back]." But Tom didn't. He drove it to Larson Race Cars in Oak Grove, Missouri

(LarsonRaceCars.net). Once there, he proceeded with his plan, which was to tear it completely apart. He took out the entire interior, windows, suspension—everything. He gutted a brand-new ZL1. Then he and Larry Larson schemed to build a twin-turbo, 2,500hp Drag Week™ Unlimited-class cruiser.

Why call it a cruiser? Because all of the interior, insulation, stock



[The license plate and overall appearance of Tom McGilton's sedate-looking 2013 ZL1 Camaro belie what's under the skin: a 2,500hp, twin-turbo monster capable of blitzing this Bow Tie to speeds Chevy never intended it to see. Tom's new license plate reads: WHY NOT.]

audio, air conditioning, heads-up display, Bluetooth, all of the factory niceties—like the electric seats, back-up camera, and OnStar—were reunited after a ton of mods to make those treks between Drag Week™ dragstrips just like a cruise in the country. “I loved it when we took our air-conditioned 1934 coupe on Drag Week™ and passed all those guys sweating in their cars, while we were as comfortable as

can be,” Tom says.

Wrenching and running your car in the Drag Week™ environment, in that Midwest summer heat, can be like running inside a sauna of trans fluid mixed with gear lube. The routine of not finding relief until late at night in your air-conditioned motel room, if you're lucky, tears participants down. Tom wants none of that. He figures



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01] Crammed in among the factory white sheetmetal is a 540ci Burlington Performance, CFE billet-aluminum big-block running 88mm Precision Turbos Gen 1 turbos combined with Precision 66mm wastegates and a Larson Race Cars air-to-water intercooler. Tom's goal is for 7.50 e.t.'s in the quarter-mile.

you can't control what you can't control, so why not do what you can to make the insanity a comfortable contest?

You've heard of Larry Larson. He's won Drag Week™ five times in a row, and he's the dude who got into the 5s with his Drag Week™ S-10 truck at the Street Car Super Nationals in 2014. He built Tom's Camaro combining what Tom thought he wanted with what Larry has learned through the years about being competitive at Drag Week™. So while the original 580hp supercharged LSA engine is finding a home in "an old truck," Tom had Burlington Performance in Raytown, Missouri, build a monster twin-turbo big-block engine for the Camaro.

Starting with a CFE billet-aluminum big-block (CFEracing.com), Burlington combined a Callies Magnum crank with Oliver billet rods and Diamond 9.0:1 flat-top pistons. The heads are BMF 405cc



03

02] Once you get a look at this angle, it becomes apparent this is not a stock or even mildly massaged Camaro. Mark Williams Enterprises full-floater axle spins 33/22.50-15 Hoosier hoops on 15x15-inch M/T billet wheels. All of this is suspended by a Larson four-link and Santhuff coilovers, and tied to the front suspension. The 4-inch dual exhaust ends with the stock-looking ZL1 tips built by Larson.

03] Buried up into the factory A-pillars and headliner is the Larson fabbed rollcage, which is one of the few giveaways that this ZL1 means business. The stock air conditioning, electric seat adjustments, heads-up display, and Bluetooth are just some of the stock features retained in the build.

intake port heads (BMFPerformance.com) with 2.325-inch intake and 1.880-inch exhaust valves. A custom-ground solid-lifter camshaft was chosen by Proline Racing's Steve Petty with a fairly wide lobe separation of 118 degrees and 272/276 degrees of duration at 0.050. The lifters and rocker arms are by Jesel.

On the top end are two Precision Gen 1 88mm turbos breathing into a CFE Racing sheetmetal intake with a Larson Race Cars air-to-ice water intercooler. Wastegates are Precision Turbo 66mm units. The entire fuel system is by Aeromotive with Precision injectors. A BigStuff3 ECU controls the engine.

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- ☐ take control



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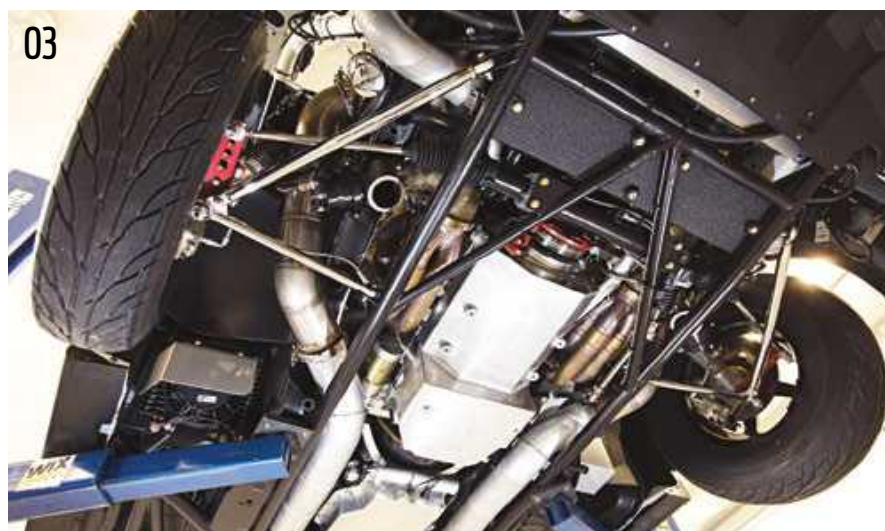


02

01 Below the throttle-body snout are crammed the necessary MSD distributor, air-conditioning compressor, and Power Master alternator—all spun with a Billet Specialties Tru Trac serpentine drive system.

02 A Wilson 90mm throttle-body flows into a Larson Race Cars—fabbed airbox. Fuel rails are Aero-motive with Precision squirters rated at 220 lb/hr, all controlled by the BigStuff3 controller.

03 Larson Race Cars built the new front subframe tied into a frame running the length of the car, along with the strut front end using Santhuff struts front and rear. Front wheels are billet 15x3-inch M/Ts running small M/T 7.50s.



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04 Were it not for the sound it makes roaring down the highway, you would be hard pressed to pay this Summit White Camaro a second glance, but the closer it gets to you, the more you can tell this is a Camaro beyond what most would imagine. All of the paint you see was factory-applied.

05 Though Chevy doesn't release specific production figures for Camaro variants, figure around 5,000 ZL1s were produced in 2013, making this one rare Camaro. Tom has put 700 miles on his car as of this writing, using the BigStuff3 ECU to adjust the different engine functions for optimal performance during its planned debut at HOT ROD's 2015 Drag Week™.

I loved it when we took our air-conditioned 1934 coupe on Drag Week and passed all those guys sweating in their cars. — Tom McGilton

In the ignition department, an MSD beltdriven distributor triggers MSD coils with a Power Grid controller and MDS 8 ignition box. Taylor plug wires, BMF valve covers, a Power Master alternator, System 1 adjustable oil pump, Moroso custom oil pan, Edelbrock water pump, and Tru Trac serpentine belt system from Billet Specialties round out the engine specs.

Transferring the engine's power is a Rossler Transmissions TH210 (TH400-based) automatic transmission assembled with a Reid Racing case spinning a Meziere billet flywheel, Pro Torque converter, Gear Vendors overdrive unit, and Strange driveshaft. The 3.70 rear-end is a Mark Williams 9-inch with 40-spline, full-floating axles.

Changes to the chassis were performed by Larson's and include tying the custom four-link rearend to the front subframe with a full-length fabbed tube chassis, with Santhuff shocks front and rear. The stock front end was replaced with a Santhuff strut assembly. Mark

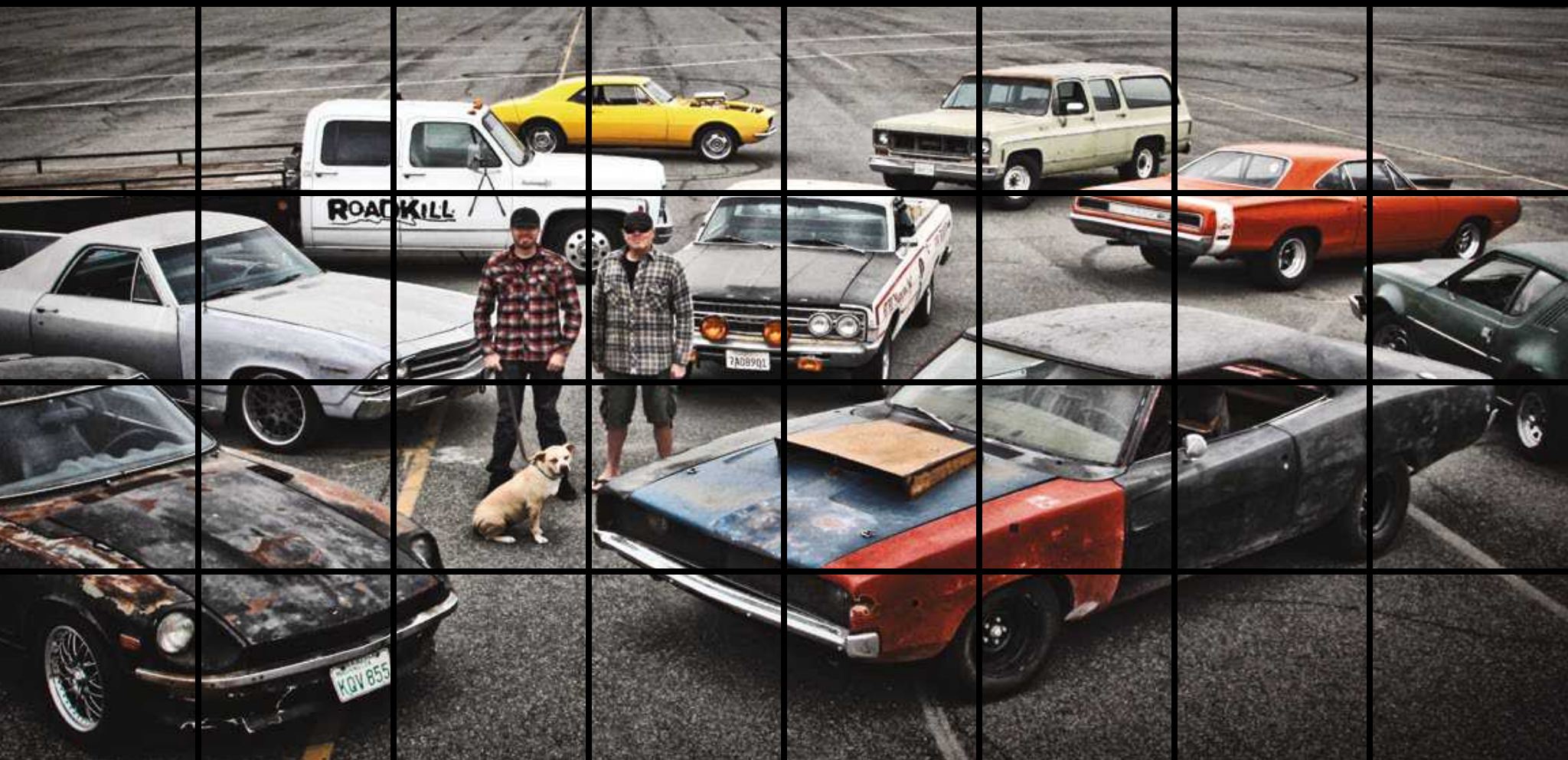
Williams disc brakes are at the four corners, controlled by a Strange master cylinder. The chassis now has an SFI rating of 25.3B for up to a 6.00 e.t. Tom and Larry's goal is for 7.50 times.

The full rollcage was built by Larson's after which the entire car was reassembled, taking care not to so much as scratch any of the factory white paint or black leather interior. "Except for the factory traction control, cruise control, and remote start, everything from the factory was put back into the Camaro," Tom says. So other than the rollcage and billet-aluminum 15-inch MT wheels and Hoosier hoops in back, nothing from the outside gives a hint to the potential the Camaro is capable of.

As of this writing Tom has put more than 700 miles on the Camaro and says, "It's a lot of fun driving on the open highway. People really notice it, especially because it doesn't sound like a stock Camaro. Then when they see how wide the rear tires are, they lose it."

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01 The horror show of putting back what you first took out, as indicated in this build photo. The Precision Performance shifter controls the Rossler Transmissions automatic nestled below the stock console. The Camaro took 14 months to complete.

02 With the rollcage in your face, this is looking more like a proper race car. But the car has been built to help the driver withstand the rigors of Drag Week™, an event where participants assemble at a specified dragstrip, make their best pass, and then drive a few hundred miles to the next designated track—and do it all over again.

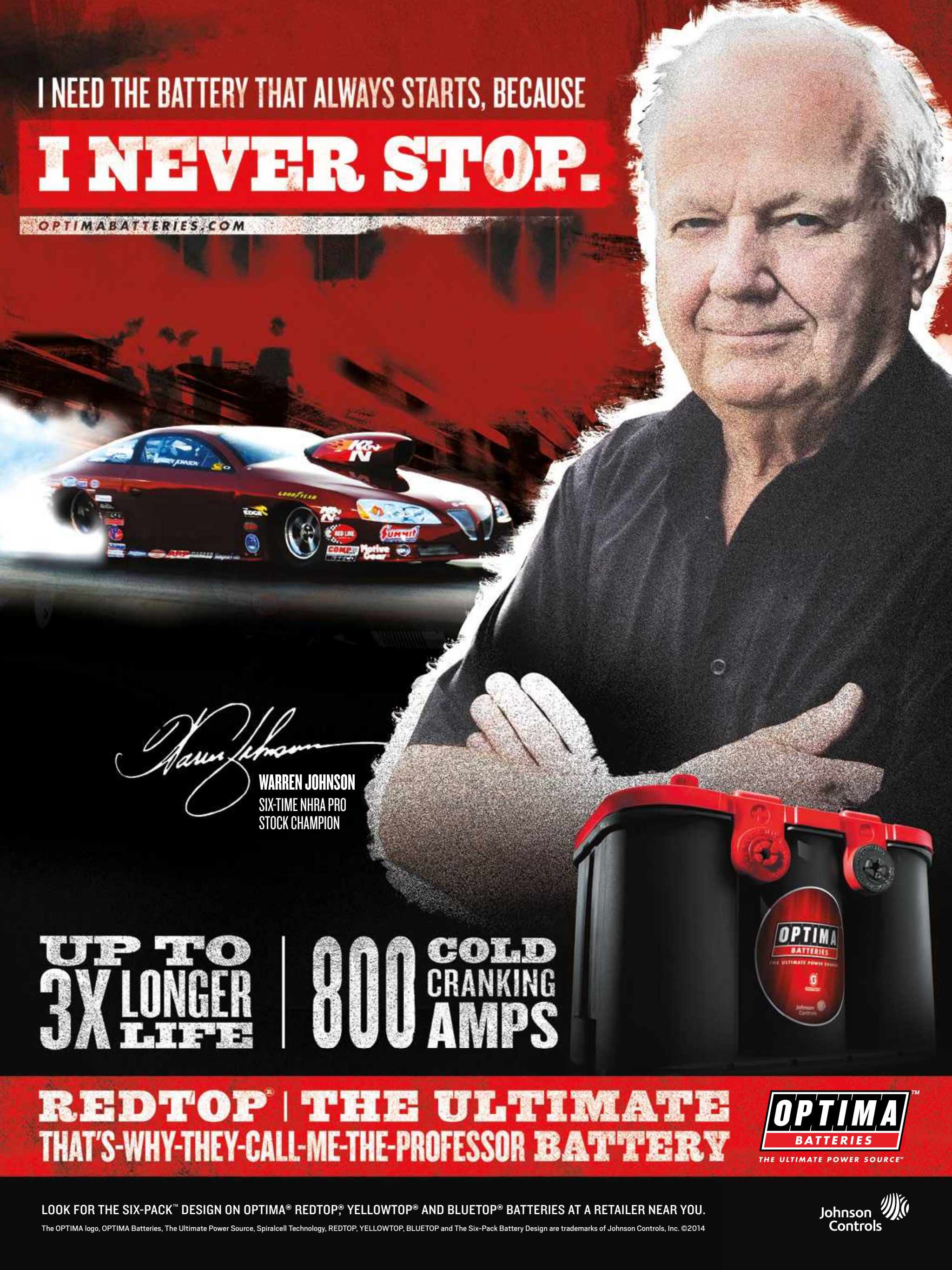
03 The fuel cell contains two fuel pumps and sending units as it's split for pump gas and race gas to allow for switching over for either racing or street driving.

WHY NOT START WITH A COPO CAR?

That can be answered with Tom's new license plate: "WHY NOT." The idea behind factory race cars is to avoid what Tom has done: changing a production car to better suit your racing requirements. General Motors has offered both complete COPO Camaro cars for around \$86,000, as well as brand-new Camaro body shells, known as bodies-in-white (PN 19243374), for around \$7,000. Yet, we doubt there has ever been any consideration given to the duality of a race car also being a comfortable cruiser, necessitating the insane process Tom and Larry Larson have applied to this particular stealthy ZL1 Camaro. Everyone approaches the different aspects of Drag Week™ in different ways, and this is yet another approach that borders on insane extremism we haven't seen before. But for those invested in the Drag Week™ experience, it's just another team to watch to either dispel or confirm Tom's plan. We'll all get to witness it come September. **THR**

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Tired of the Hellcat Hype?

Six Hellcat Killers You Can Build at Home

✍ Thom Taylor 📷 HOT ROD Archives

➤ These are the “good old days” of the muscle car all over again—as performance, handling, and technology have vastly improved since the 1960s. The 707hp Dodge Challenger and Charger Hellcats have raised enthusiasts’ hearts and minds to new excitement levels, and rightly so. You’ll be hard pressed to replicate this performance, technology, and adrenaline rush wrapped in a new-car smell, warranty, and level of parts compatibility and package development. So if you’ve got the cash, go out and buy one now—you’d be crazy not to.

But we understand many hot rodders are looking for the heightened performance and brutal horsepower of a Hellcat—at a more affordable price. Being hot rodders, we have the ability to make that a reality, so before you is our framework for building a Hellcat killer on a Kia budget.

We’ve chosen various less-expensive coupes and sedans, along with Hellcat-like engine and drivetrain options. These would be

well-maintained, rust-free, air-conditioned cars capable of high-10-second quarter-mile sprints, yet still be able to function as a grocery getter. And they must come in at much less than a new Hellcat’s \$64,000 tab. We’re only looking at cars built in the last 25 years to avoid rust, electrical, fuel, and cooling-system issues older cars can introduce. But if an older car is your desire, we encourage you to pursue that avenue, too.

Building your own Hellcat killer means you wouldn’t be able to take advantage of the manufacturers’ warranties, financing, or that new-car-rush, but you will be rewarded with a unique, quick sleeper and all of the modern technology and components, without the requisite bank-account drain or multi-year finance monkey on your back. Your abilities, resourcefulness, and access to the world of used cars, wrecking yards, and parts counters will ultimately determine whether this is just a mental exercise or something you might successfully entertain. We hope you choose the latter.

📷 Wes Allison



01 | 2008–2015 CHALLENGER OR CHARGER

The 2008-and-newer Challenger came with a five-speed automatic and V6 in base form. Used prices start around \$14,000 for low-mile examples, with salvage-title Challengers in the \$10,000–\$12,000 range. Hellcat crate engines are projected to cost around \$16,000, though there seems to be some factory holdup. The V6 and SRT Charger or Challengers use the same NAG-based transmission, so starting with the cheaper V6 car, you have the core for an SRT-compatible drivetrain. Or you could opt for the stock

five-speed if you’re on a budget. Choosing to go with the exact Hellcat drivetrain package, a brand-new ZF 8HP90 eight-speed automatic with its extra friction plates and higher-capacity pan will set you back around \$3,000. The Hellcat Tremec six-speed manual trans goes for less than \$3,000. A 9¾-inch Dana 60 or 9-inch Ford rear goes for around \$2,000 if you want a solid axle for the strip. Factoring an additional \$10,000 for the “extras,” you’re looking at a \$20,000 savings.

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02] 2010–2015 CAMARO

A Bow Tie Hellcat killer has so many possible engine combos with the LS engine. The fifth-gen Camaro came out in 2010, with the LS model the least optioned and, thus, lightest and cheapest. Figure a base V6 in the \$12,000–\$14,000 range. Nice salvage-title fifth-gens are all over the range, depending on damage and condition. Figure \$5,000–\$8,000 for a nice, low-mileage salvage. LS3 engines, which were the factory V8, are lower-priced big power. A drop-in, 800hp, twin-turbo LS3 can be a bit past \$20,000. Over-the-top, 1,200hp, twin-turbo, intercooled and injected versions fall in the upper \$30,000 range, proving that spending more gives you more. With an LS7, Mast Performance lists its 900hp 7.0L for less than \$29,000. A Stage-3 4L80E automatic that can withstand 1,100 hp will cost \$3,500–\$4,000. Again, incidentals could cost \$5,000–\$10,000 more. This Hellcat killer with 800-plus horsepower will set you back more than \$40,000, which is still a bargain with a Bow Tie smile and more than \$25,000 savings.

03] 1991–1996 CAPRICE, IMPALA SS, OR POLICE PACKAGE IMPALA

There have been countless 1991–1996 Impala sedans built with more than 700hp capabilities for years. With the range of engine options, you can build the most bargain of bargain basement Hellcat killers. Low-mileage Impala SS sedans can be snagged for less than \$10,000. For a straight Impala or 9C1 police package with some hard miles,

then \$5,000 will work. The 1991s tend to be a bit cheaper because they are a year older and only came with a 305ci—the 350ci was first available in 1992. Don't forget the wagons. The same fifth-gen Camaro powertrain and price suggestions apply to the Impala, but your entrée will be significantly less.



04] 1996–2014 MUSTANG

Since there are more aftermarket options for Coyote and the venerable Mod Motor, first you must determine whether you start with a pre-Coyote Mod-Motor or go Coyote overhead cam with its broad torque curve. Edelbrock sells a 5.0L supercharged Coyote crate engine rated at 700 hp with 606 lb-ft of torque for less than \$22,000, beating out the factory Voodoo 526hp GT350 by plenty. In the Mod camp, there's 5.4L or 5.8L versions putting out 1,200 hp at 950 lb-ft of torque for less than \$30,000. The 2005–2014 Mustangs accommodate either engine and are available in prices from salvage fixers for \$5,000–\$6,000 to V6 base models starting around \$8,000—in both fastback and convertible. A new 4R70W four-speed automatic transmission comes in at less than \$3,000, and there's also Tremec five- or six-speed options. A Cobra Jet 9-inch from Ford Racing will set you back \$2,700–\$3,000, or a Strange or Currie 9-inch for the same money. Ford Racing has the engine control pack that gets the powertrain running in these cars. A Roush Coyote hydraulic power-steering system or Ford Racing's electric power-assist steering is needed as the Coyote's wide architecture prevents a conventional power-steering pump. With a few thousand dollars for incidentals, figure less than \$45,000 for a Mustang hiding as much as 1,200 hp.

05] 1998–2012 FORD CROWN VIC/MERCURY MARQUIS AND POLICE INTERCEPTOR

Your options are much the same as the Mustang, you just need a little less ka-ching because Crown Vics and Police Interceptors go for bargain-basement prices. Keep in mind that Crown Vics, whether privately owned or police versions, see lots of miles, yet low-mile versions are usually not much more expensive. The trick is patience, as more high-milers are out there than low-mile creampuffs.

06] 2008–2015 CADILLAC CTS OR CTS-V

When considering swapping the LSA that 2009-and-up second-gen CTS-V Cadillacs came with for the larger-displacement LS7, we think it's better to stick with the smaller-displacement LSA. Low-end torque is better for a car tipping the scales at almost 4,000 pounds, and there are limits to how far an LS7 can go beyond 700–750 hp. Lingenfelter sells 700hp, 378ci LSAs installed for a bit over \$11,000. Yes, installed. There are differences between the standard Cadillac CTS and the upgraded CTS-V, so it might be worth looking for a salvage CTS-V. We've found flood-damaged CTS-V sedans for \$10,000–\$15,000. Changing out the electronics, engine, and transmission would still put you well below half the cost of a Hellcat. There's even a wagon version. **HR**



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THE SHED

Old-School Hot Rods From a Homebuilt Shop

✍️ 📷 Scotty Lachenauer



Dave Baur's "shed" was put together in two weeks and replaced his original tarp-and-dirt-floor workspace. At 24x14 feet, it's just the right size for Dave and his two Fords—anything bigger would just be wasted space.



► Dave Baur of northeastern Pennsylvania arrives in his pale-yellow 1930, the hot rod that he's logged more than 70,000 miles in since he built it under a temporary tent structure on his graded dirt driveway. It's also the rod he's driven down the East Coast and back more times than he can remember, and the same one that he consistently drives to hot rod festivities across the country.

Dave usually pulls up in one of his two custom-made roadsters: the W-motored 1930 or a flathead-fueled 1929 phaeton

he's been wrenching on for the last few years. Both cars were skillfully made from the spare and unwanted parts discarded by others. Dave built every inch of both of these asphalt eaters by himself at his personal country home and fab shop, a place affectionately referred to as the "shed."

THE SHED

Fifteen years ago, Dave moved into his current home. It was almost everything he wanted: a quiet lake location snuggled

back off the road sitting in the stillness of the thick Pennsylvania woods. It just didn't have a garage to work in. Dave decided that a lack of suitable roof overhead was not going to slow him down. He set up shop out on the dirt driveway and erected a heavy-duty tent to work under.

Running power from the house, he built a chopped 1950 Mercury right there in the dirt—from the bodywork to the mechanicals, even the gloss-black paint. The Merc was well known in the surrounding towns, and stood on its own as a

killer custom rod.

Through the years, Dave continued to put together radical rides there in the gravel. The sturdy tent held up well for some time, until one winter when the Northeast got plowed under in the white stuff. The tent collapsed under the weight of the snow—onto his project car. Dave decided then enough was enough, there was going to be a garage raising that spring.

Dave went out that April and, in true hot rodder fashion, put up the shed in just two weeks. Once completed, he ran a heavy

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electrical cable from the house for power, and his workshop was in business. Things were easier with a solid roof over his head, and his 24x14-foot workspace was just what he needed to pull off some more intricate custom rides.

THE 1930 ROADSTER

Dave's 1930 roadster was built while he was still out on the dirt. The project came to life after he rescued the body from a dump in Wyoming. He based his ride around a set of ASC reproduction deuce rails, which he narrowed to get the Model A body to fit just right. He then welded in a homebuilt transmission crossmember and a custom rear crossmember to help cradle the drivetrain.

Up front, he put a 4-inch dropped axle with a monoleaf spring to get the nose low. Out back, a triangulated four-link with a 1934 Ford leaf spring gives Dave the ride he wanted. For stopping power, he went with early Ford juice brakes up front and Chevy S-10 pickup brakes out back to get the functionality of a more modern

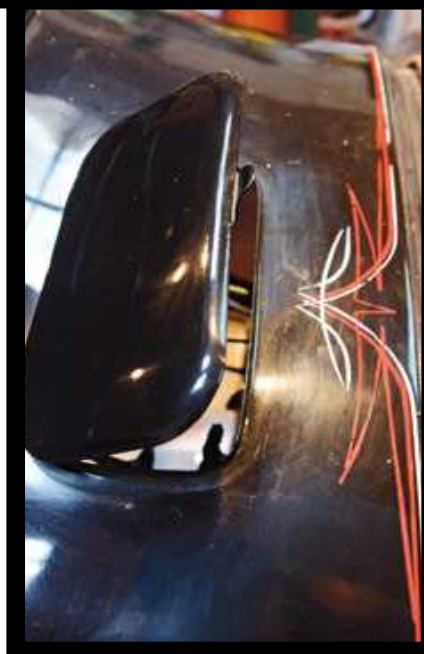
braking system to run the roadster consistently.

For power, old-school Dave went with a 1959 Chevy 225hp 348 W-engine with Tri-power carbs. Behind it, a T-5 five-speed out of 1985 Camaro with an S-10 tailshaft does the shifting. With this setup, Dave feels the combo is bulletproof, and he's driven the roadster on long jaunts all over the Eastern seaboard proving the point.

Body-wise, Dave made the dash rail from a 1929 coupe, which he had to modify to fit the 1930 doors. He installed a 1932 dash full of Stewart-Warner gauges, did the upholstery with an EZ Boy kit, and custom-made the cool wood-rail cockpit surround out of oak. The hood? Well, that's also from a Chevy S-10. He cut out the centersection of the truck's OEM steel and hand-fabricated the piece to shape for a custom look.

THE 1929

Dave's next project has been in progress for the last year. It's an interesting amalgam of a few Ford pieces, mainly consisting of a 1929 phaeton body out of Argentina. It, too, is made with



[Dave built his 1929 using an Argentinian body with a few custom touches—like this 1927 Ford gas-filler cover used as a cowl vent.]

salvaged usable parts nobody else seemed to want. What Dave doesn't have, he can fabricate. "Anything they sell in a catalog, I can make right here in my shop," he says.

The 1929 has some custom touches. The cowl has a 1927 Ford gas filler cover, and it's used as a cowl vent (it also makes it easy to get to the back of the gauges). The frame is of 1930 vintage, and Dave put a 6-inch kick-up in the back and a "V" up front so this roadster would ride low. Up front, there's a suicide-hung front axle; out back, the 1936 Ford rear is stuffed with 3.25 gears and spun by a shortened Model A driveshaft. Stopping power comes from early Ford juice brakes with

Buick finned drums up front.

For motivation, a 1952 274ci Mercury flattie, ported and relieved with a Schiefer aluminum flywheel, does the pushing. It's topped with Edelbrock heads and intake, the latter topped with three Stromberg 97s. An Isky 400JR camshaft gets the valves jumping. A stock 1939 Ford transmission does all the shifting for the black roadster.

A modified gas-tank face creates a cool dash that's been stuffed with Ford F-1 truck gauges. A 1930 commercial grille—shortened, narrowed, and made deeper—houses a custom radiator. A pair of 1936 Ford hood sides were shortened and re-contoured to fit. They attach to an aluminum hood made from a late-model Ford Taurus—we kid you not.

SPARTAN STYLE

Dave's a low-key guy, but we know of at least one thing that gets him ruffled around the edges—guys who don't run their cars. "We build hot rods to drive, and it makes me sick to see them not used for what they were built for," he says. "I'm out in my cars every day it's possible, and since I'm retired, that's pretty often."

Looking around at Dave's shed, you harken back to a simpler time in hot rodding. His trappings are basic, and the proprietor says he can do most of his work with a few essential tools. "With a Sawzall,

Cut it, burn it, grind it, chrome it, or paint it, but don't billet.
—Dave Baur



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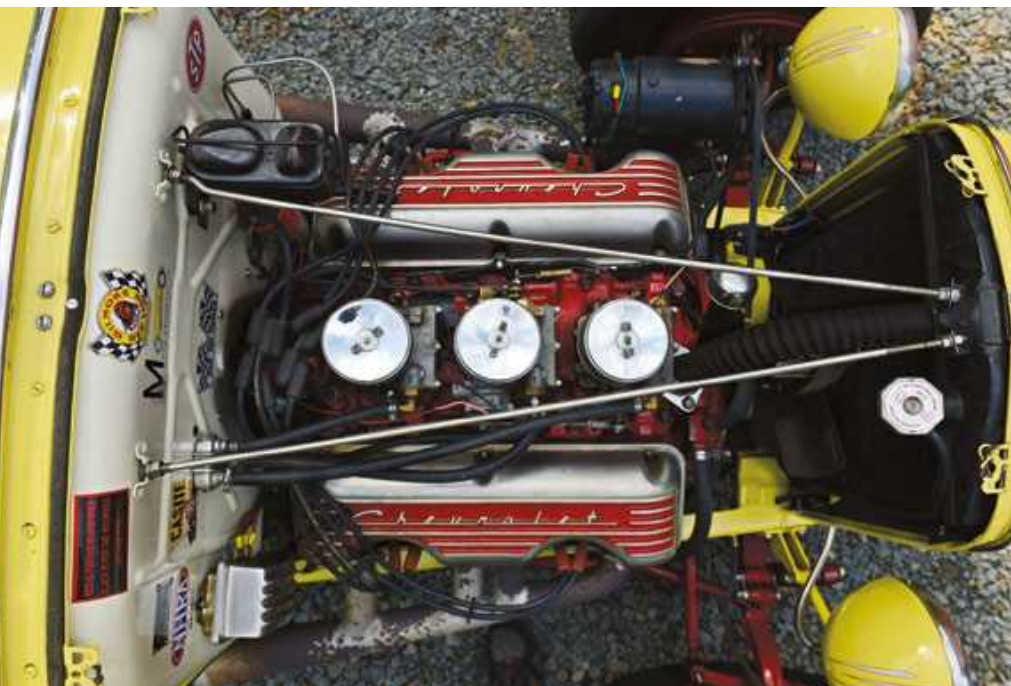
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THE SHED

Though it's a Ford, the driveline is Chevy. The 348 in the 1930 runs through a T-5 transmission and feeds an S-10 reared stuffed with 3.42 gears, which has proven to be a strong combination in the roadster.



a well-used set of torches, and a selection of hammers, I can do almost anything I need to do," he says. Looking around the Shed's perimeter, just a few more bare necessities can be found: a MIG welder, a small compressor, a drill press, and an assortment of basic handtools.

The Shed seems almost medieval in this day and age, and that's why we like it. Seeing someone make do with what's available to the things he needs, that's the sign of a true artisan. **MR**





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GM LS Gen IV Tach Driver - Catalog Page 63

The ECM used in GM Gen IV applications does not have a tach output wire to provide a tach signal to a tachometer. This small device converts the 5 Volt 58X crank sensor signal from any Gen IV GM V8 engine into a 12 Volt signal useable by most aftermarket and OEM tachometers. **60150**



Clean Up Your LS Installation

GM LS Coil Extension Harnesses - Catalog Page 63

Clean up your LS installation by moving the coil sets off the valve covers. Includes two pigtails to relocate coils. Factory color coded wires and weatherproof connectors. One drivers side, one passenger side pigtail. **60128 - 36" 60129 - 48" 60127 - 24"**

Universal Fuel Pump Relay Kit - Catalog Page 77

A relay will prevent voltage drops at the fuel pump thus maintaining constant fuel pump pressure, and will prevent fuel pump amperage from damaging the electrical system. It's a good idea to relay your fuel pump for the street and a must when you're racing. **50102**

Hot Shot Amperage Booster - Catalog Page 77

Designed to overcome starting problems due to an over-heated GM style starter or worn out electrical system. Works by boosting amperage to the starter solenoid. **30202**



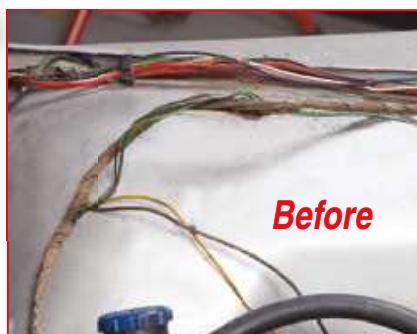
Maximum Starting Power

Exclusive - Power Braid & Classic Braid Wire Wrap Kits - Catalog Page 73

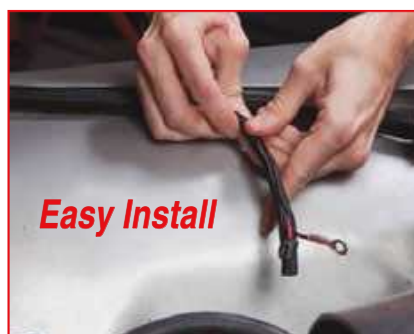


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Before



Easy Install

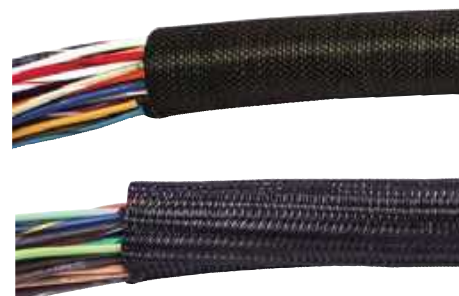


After

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THE BLACK MARLIN

 Brandon Gillogly

 Jorge Nunez



[Owner and builder Bob Bruhn reshaped the Marlin's front wheel opening and removed the wheel opening and rocker trim. American Racing Torque Thrust IIs are used all around, with 17s in the front and 18s in the rear. The car rides on AccuAir suspension.





01

01] The peak of the rear fender was capped by chrome trim from the factory. Removing it required reshaping the peak, which is now a bit sharper. The taillights are smaller than the factory pieces and frenched into the tailpanel.

02] The factory Marlin trunklid was the same width as the rear window and trim. Bob removed the trim surrounding both the trunklid and rear window, flush-mounted the rear glass, and widened the trunklid 5 inches to better match the fastback's full width.

03] The honeycomb grille was CNC-machined from aluminum.

04] This bodyline is factory AMC, although it would have been covered by stainless trim. Bruhn removed the trim and allowed the bodyline to be a focal point.



02



03



04

» Who doesn't love an under-dog? We HOT ROD editors tend to flock to the oddballs, the quirky body styles that were ahead of their time and weren't truly appreciated until they were long canceled by their makers. Many AMCs fit the bill, especially the Rambler Marlin, a three-year-only model that helped steer muscle-car styling for years to come.

Bob Bruhn's 1965 Rambler Marlin was on display in the House of Kolor booth at the 2014 SEMA show in Las Vegas because of its amazing, custom-mixed, black-cherry paint, but the canvas it was sprayed on

is deserving in its own right. Perhaps the most impressive thing about the Marlin is that Bob did all of the custom body modifications, chassis work, and final assembly in his home garage. Because we didn't have a factory Marlin parked alongside to compare it with, there were some changes we didn't notice until Bob pointed them out. When we asked what inspired him to cut up the rusty \$1,800 car three years ago and begin its transformation, he told us in a matter-of-fact way: "It was sitting in the driveway."

Bob had a few of the major sheetmetal modifications in

mind and had already begun some of the major surgery on the roof while designer Keith Kaucher of Kaucher Kustoms helped dial in the details with a rendering. The two biggest exterior modifications we immediately noticed were the nose of the car and the top. Even though we couldn't tell just what had been done, we knew it looked better than any stock 1965 Marlin. Bob cut the roof free of the windshield header and side windows and laid it down until the rear window looked right, which took about 2 inches out of the height of the C-pillar. Imagine the whole roof pivot-

ing down in front while hinged along the back of the fastback. The rear of the roof was then fixed in position and the front portion of the roof was lifted up and pancaked to more closely match the windshield, which is still at the factory height. Bruhn gave us an even more detailed version of how the chop was done, but the bottom line is that he cut all of the ugly out of what was once a rather bulbous roof and left a much more sleek design looking like it could have been a factory concept. It's clearly more in line with what designers would have wanted and less like the factory roof that



I don't let the car leave my garage, it takes too long to get it back."

— Bob Bruhn on building the car all within his three-car garage

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THE BLACK MARLIN



The dash sheetmetal is factory, although now it's filled with Dakota Digital custom analog gauges. A 1954 Pontiac steering wheel was cut down to 15-inch diameter.



The LS3 uses remote coils and an electric water pump to minimize distractions under the hood.

seems to be a compromise for rear passenger headroom. In fact, it looks a lot like the redesigned, better-looking Marlin that AMC launched as a 1967 model on the larger Ambassador platform.

As for the front, 1965 Marlins had a rather flat grille with slightly protruding headlights. Stock, it's not a bad-looking car, but it's perhaps a bit goofy—sort of like a 1964 Chevelle that was squeezed until its headlights

bulged out. Sorry, AMC fans, we call 'em like we see 'em. To make the Marlin more muscular, Bob used a cowl-induction hood from a 1970 Nova and stretched it both toward the windshield and forward to cre-

ate a peak. Lucky for Bob, the width was nearly dead on and only required a bit of finesse on the edges to create a tight gap with the fenders. Bob kept his eyes open while visiting local car shows, scouting for the right



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THE BLACK MARLIN



donor for a front bumper. He finally found the right shape in a 1965 Dodge Coronet rear bumper. Not just a simple bolt-on, the heavy Mopar chrome was cut into seven pieces and welded back together to fit the new prow. The same process was done in the rear to bring the Marlin's factory rear bumper closer to the body. The new peaked front end required custom headlight bezels and grille insert, both of which were machined from billet aluminum. For the finishing touch, Bob sculpted a marlin figure out of brass and had it chromed.

The body was channeled 3 inches over the suspension for a low stance and an AccuAir air-spring suspension replaced the front struts and rear coil springs. That was no small feat considering the Marlin is a unibody. A front suspension from Scott's Hot Rods with upper and lower control arms helped to get rid of the factory struts and streamlined the procedure, but Bob confessed that if he had to do it all over again it would have been much less hassle to go with a full aftermarket chassis.

Under the hood, a Chevy LS3 uses ported heads and a new Comp Cams camshaft has been installed to the tune of about 600 hp. An MSD Atomic EFI throttle-body injection system adds the convenience and performance of fuel injection while still looking the part of a carbureted engine. Further cleaning up the engine bay, the plug wires run to coils under the dash and the whole engine and accesso-



01 An AccuAir E-level controller and manifold are in the trunk between twin ViAir compressors. The air tank is mounted just ahead under the package tray.

02 An upholstered panel conceals the Painless Performance Products fuse box and a battery tender

ries were sprayed with Sherwin Williams Rugged Tone for a bare, bead-blast look. The entire engine bay is framed by custom inner fenderwells painted in the same custom House of Kolor black cherry. The rest of the powertrain is a 700R4 trans and Ford 9-inch with 3.70 gears.

03 A Tilton master cylinder provides the hydraulic pressure for 14-inch Wilwood brakes at all four corners.

04 To maintain a sleek engine bay, Bob created a smooth panel over the grille and core support that also serves as the shroud for the Flex-a-Lite electric fan. The radiator mounts from below. March pulleys and an electric water pump also serve to streamline the engine compartment.

You can't talk about the Black Marlin without mentioning its paint. The immaculate finish was sprayed by Steve Gaboury in a spray booth that Bob rented



05 Here's a factory Marlin for comparison. Note the taller rear roofline and thicker C-pillar.

06 For 1967, AMC moved the Marlin to the larger Ambassador platform for its final year of production. The extra wheelbase combined with the Ambassador's stacked headlights and a new roofline gave the car a whole new demeanor.

for a weekend. The multi-stage process began with KD3001 sealer, then two coats of Jet Black basecoat were topped with two coats of Russet Pearl. Then three coats each of Brandywine, Apple Red Kandy, and the House of Kolor Karrier that the Kandy is based on. Finally, four coats of Kosmic Klear were shot to give depth and the ability to cut and buff the surface to perfection. **HR**

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HANDBUILT HEMI

This **1971
Challenger** Was
Restored Entirely
in This Garage

✍️📷 Brandon Gillogly

► Built entirely in a detached garage in the backyard of his Northridge, California, home, Larry Van Zyl's Hemi-powered 1971 Challenger has been 10 years in the making. From the engine and suspension to the bodywork and paint, all the work on the car was done within 20 feet of Larry's back porch and was optioned just the way he would have ordered it in 1971 (had he been a car-buying adult back then). Even the headliner and vinyl top, the only two pieces of the car that Larry and his friends didn't do themselves, were completed on site and amounted to a day's work and \$300 in labor.

Larry's history with the car started 10 years ago, when Larry and his friend, Bryan Bulbow, were looking for a car to restore. Their plan was to ask their local UPS delivery driver if he'd seen any cars that had been parked for a long time, knowing that he'd probably been running the same route for years and was familiar with the neighborhood streets and possibly even the side yards where potential project vehicles might lurk. Larry was looking for Mopars in particular, and the driver had one come to mind right away.

He pointed them to a neighborhood in Simi Valley, California, where Bryan and Larry drove up and down every street. They

[Larry Van Zyl and his friends, Tom Yeager, Bryan Bulbow, and James Scott, spent nights and weekends building a 528ci Challenger with all the right options.



[The Challenger wears 15x7-inch Magnum 500s with 245/60R15 BFG Radial T/As in front and 275/70R15s on 15x8-inch Magnum 500s in the rear.]



[The Ray Barton 528ci Hemi uses a World Products iron block and Mopar aluminum heads setup for 10:1 compression. Mopar doesn't publish cam specs and Ray Barton won't say, either; the best guess puts the cam at around 0.600 lift and 250 degrees of duration at 0.050. The engine breathes through a single 850-cfm Holley 4150 manual choke carb and exhales through a set of ceramic-coated TTI headers to dual 3-inch exhaust with Dynomax mufflers. Cooling chores are handled by a stock water pump, a Flex-a-Lite fan, and a Griffin radiator.]



[All 1971 Challengers equipped with a street Hemi used a manual choke to pass emissions, so Larry's Challenger does the same. A Hurst pistol grip shifter is linked to a 1971 New Process A833, 18-spline Hemi four-speed.]

spotted a 1971 Challenger nosed up to a garage after about an hour of searching, and Larry jumped out of the car before Bryan could even stop. The car had been sitting for a decade or so, and although the dry Southern California climate preserved the sheetmetal quite well, the 318ci V8 and TF904 Slap-Stick automatic hadn't run in years. The car was intact except for some minor damage caused by a tire blowout some time in the car's past that mangled one of the quarter-panels. Larry spoke to the son of the original owner, made a modest offer, and exchanged phone numbers.

Over the following three years, Larry called several times to check on the car and eventually doubled his offer, which the owner finally accepted. He towed the car home, got it running, and parked it. Larry wanted the ultimate Mopar powerplant, so while he day-dreamed about the perfect engine, the Challenger took a backseat to

some of his other projects, including a Pontiac LeMans convertible, an early 1965 Mustang convertible, and two Plymouth 'Cudas (a 1973 and a 1971). In 2014, the last piece finally came together. Larry put the 1973 'Cuda up for sale, and former HOT ROD editor David Freiburger just so happened to have a desire for a new car and a Ray Barton Hemi with a 4.5-inch bore and a 4.15-inch stroke that was in need of a home. After some trading, Larry went home with the Mopar Hemi and installed it in the engine bay of the Challenger with help from friends Bryan Bulbow, James Scott, and Tom Yeager.

Those four guys were responsible for nearly all of the work, everyone pitching in on all aspects of the build as the Challenger's restoration progressed on weekends and the occasional weeknight during the course of a year. A new rear quarter and a rear window surround from Stephen's Performance (StephensPerformance.com)



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[The intake is a Ray Barton single-plane that's taller than any of the factory Hemi intakes, necessitating a 1970 T/A hood. The engine is rated at 640 hp and revs to 5,800 rpm.]

were welded in place to fix the only two damaged parts of the car's shell. Next, Larry and his friends block-sanded the car and stripped the interior in preparation for paint. Once the interior was painted and ready, he applied Dynamat to the inner door panels, roof, and floorpans, and installed new carpet, seat foam, and leather upholstery from Classic Industries.

The Hemi was linked to a 1971 Mopar four-speed with a McLeod clutch and on to a 1971 8¾-inch rear axle with a 3.91:1 ring and pinion with an Inland Empire Driveline aluminum driveshaft. Although a 426 four-speed car would've been equipped with a Dana 60, Larry left the 8¾ in place, knowing that the 275/50R15 BFGoodrich Radial T/As out back would go up in smoke long before the rear axles were taxed to their limit. The guys then rebuilt the torsion bar front suspension with Firm Feel (FirmFeel.com) 0.940-inch torsion bars, KYB shocks, a Firm Feel sway bar, and Moog ball joints.

Larry and his friends essentially completely stripped and built the Challenger in a year, with Larry sweating all the details and hand-fitting everything that had been quickly bolted together on an assembly line more than 40 years ago. As the car got closer and closer to being done, and the block sanding was wrapping up, Larry decided that the weather was perfect for a paint job. He sprayed and then buffed the two-stage PPG silver himself in his backyard garage and shortly thereafter had an upholsterer apply the vinyl top. He drives the car on weekends and is actually quite easy on the Hemi's throttle, much to the dismay of his friends, some of whom have had their turn behind the wheel to put the car's limited traction to the test. 



[Some Hemi E-bodies were equipped with air conditioning by dealers and would've used the Mopar RV-2 compressor that would have interfered with the factory air cleaner found on both the Hemi and the 440 Six Pack. Larry soldered new fittings to the original car's A/C lines, so while the Sanden compressor is new, it looks right in the engine bay.]



[The Challenger had sat uncovered in a driveway, so it was sun-bleached and the plastic trim was brittle. Remarkably, Larry was able to restore the original grille with some ingenuity and managed to keep it all intact. The multi-piece grille was riveted together from the factory, and it had to be disassembled to get proper paint coverage. Larry chucked an extractor bit in a drill and used that to spin the rivets and get them warm enough to deform when driven out. The grille was then fully repainted and reassembled using the original rivets. Bumpers are re-chromed originals.]

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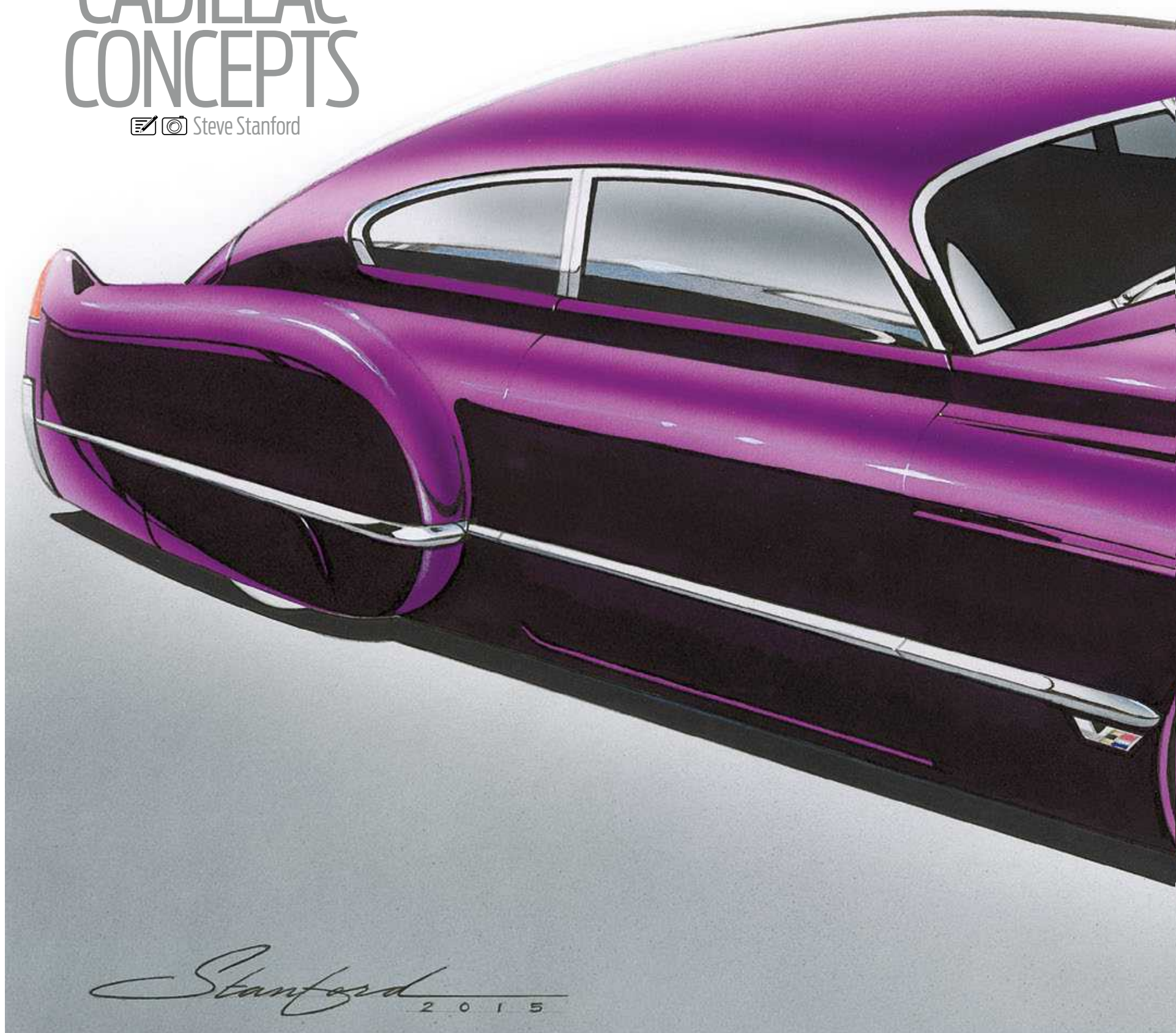
IS FOR VINTAGE CADILLAC CONCEPTS

  Steve Stanford

► Imagine a wide-eyed kid, brimming with enthusiasm, with his nose pressed against the wide, expansive glass of the local Cadillac dealership. An easy walk from where he lives, this place is a dream factory for a kid who is years away from a driver's license. But at least he can pick up a few brochures and literature and pore over the glossy images of the automotive good life depicted within. And nothing can top a shiny, new Cadillac as a symbol of worldwide success—"the standard of the world," as its motto used to boast.

It's the late-1960s and that young kid is me. The Cadillac brand left as lasting an impression on me as big-block muscle cars left on others. While I like high performance, too, I'm more of a cruiser at heart.

Recent years have seen Cadillac move beyond its tailfinned, land-yacht past to become a world-class BMW fighter, with a new performance image buttressed by the V-Series performance models. They go, corner, and stop with aplomb equal to anything worldwide.



GM promises even better things in the years ahead for the brand, so hold on tight. The new V powerplants got me thinking: Cadillac engine swaps into different cars has been going on since the 1950s with the 1949-and-later V8 going into everything from deuce roadsters to shoebox-shaped 1950s sedans and race cars of all types.

Today these hot new drivetrains are not an issue, but the modern bodies cloaking all this are. To be frank, the newer designs I've had a hard time accepting. I miss the Harley Earl/Bill Mitchell days of the "longer, lower, wider" command presence of old. I know times have changed, but still—they were classic.

Why not have the best of both worlds that only a hot rodder can provide: swap the new V powertrain into some iconic, traditional Cadillac sheetmetal.

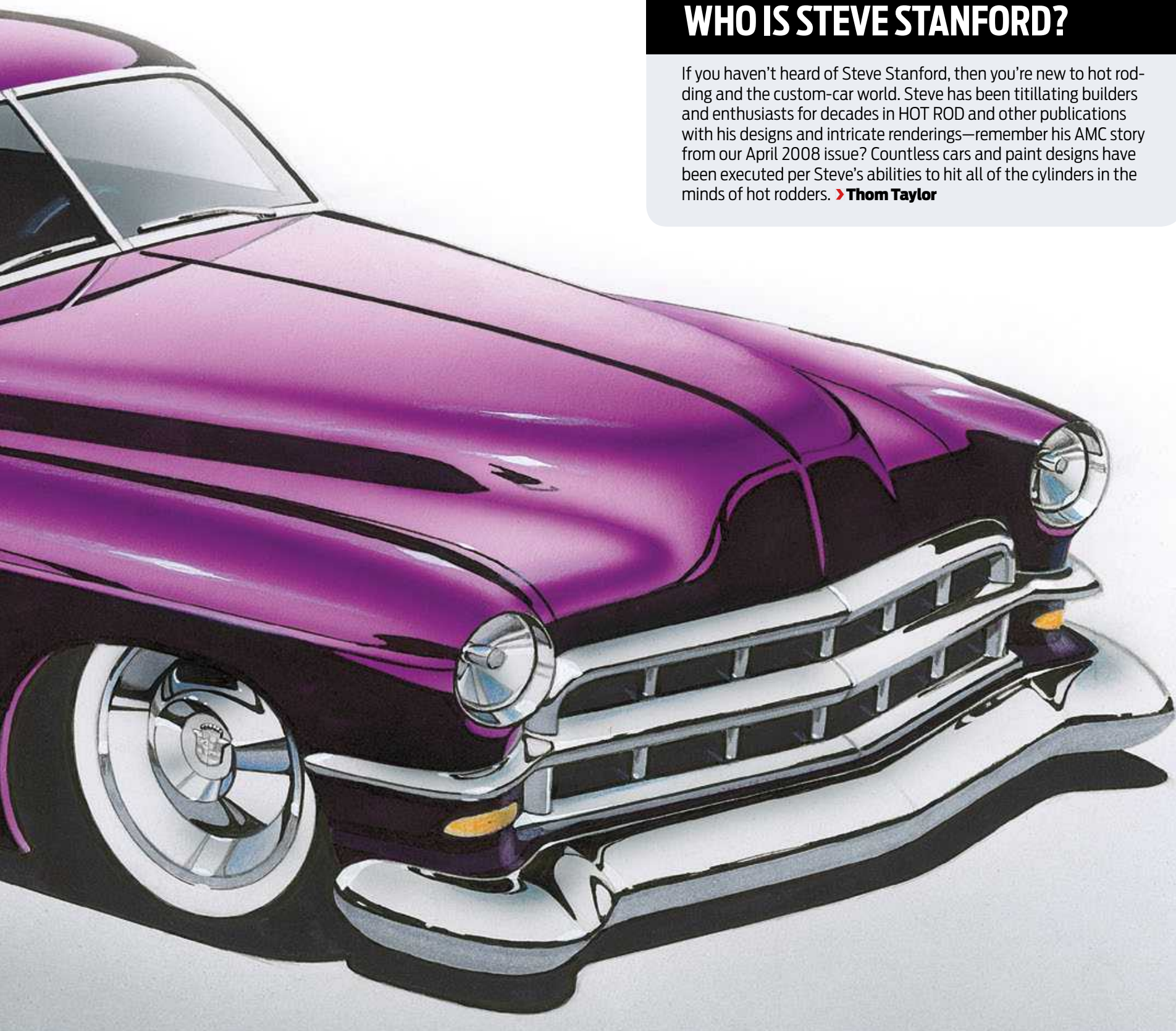
Big fins, sleek fastbacks, a beach-cruiser convertible, or a sleeper of a late-1970s Seville four-door—let's blend the best of the classic and the contemporary. So I broke out the pens to show you what I mean.

1949 FASTBACK (BELOW)

Cadzilla put the 1948–1949 models on the map. Achieving "milestone" classic status years ago, these Cads are good-looking from any angle. Only a few changes were made here; an inch and three-quarters out of the roof allow for the new door/window frames to maintain correct proportions (note, too, no vent windows). The 1952 Ford headlight rings are frenched in; the hood nosed and peaked; and the stock grille has the lowermost horizontal bars shortened. A 1949 Buick gave up its forward side trim; it's longer than the Cad piece and extends all the way to the rear quarters. The stock bumpers are shaved, the rear deck cleaned off, and stock taillights frenched in. About those wheels: They're custom 18-inch units cut to look like Cad sombreros; they're larger to make room for the bigger brakes within. Of course, the transplanted V powerplant moves this fleet fastback out in a hurry, which is why the larger brakes are necessary.

WHO IS STEVE STANFORD?

If you haven't heard of Steve Stanford, then you're new to hot rodding and the custom-car world. Steve has been titillating builders and enthusiasts for decades in HOT ROD and other publications with his designs and intricate renderings—remember his AMC story from our April 2008 issue? Countless cars and paint designs have been executed per Steve's abilities to hit all of the cylinders in the minds of hot rodders. ➤ **Thom Taylor**

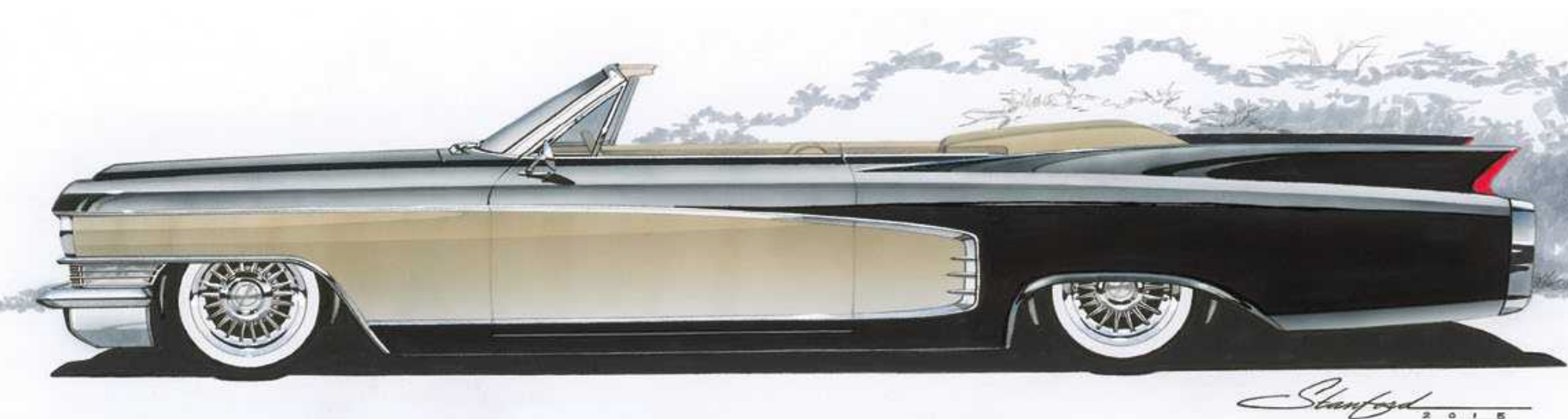




1959 COUPE DE VILLE

Time to use all your talents here: time, money, ability, patience, tools, a roomy place to work, and plenty of supplies; this is a complete re-body. In fact, the only things other than the chassis retained from

stock are the front and rear grilles, some interior trim, the dash and wheel, and the bullet taillights. All else is made from scratch. Build a Motorama dream car that never existed.



1963 CONVERTIBLE

This car looks wilder than it is. The side sculpturing is influenced by the 1957–1958 Eldo Brougham but with handmade trim. The rear wheelwells are opened up like the 1964 Eldo and the taillights are re-

shaped like the 1960–1961 lighting. I've always liked the 1955–1958 Cad sabre-spoke wheels, so the new ones here reflect that styling. The 18-inch diameter allows for bigger brakes.



1975–1979 SEVILLE

Here's a real sleeper concept. These Sevilles are a natural for a modern sport sedan treatment. Plenty of room in a reasonably sized package for fun; with the complete V drive-train (perhaps even all-wheel drive?) and V-influenced exterior trim, what a perfect blend of old and new. Wonder if you can swap in a complete CTS-V interior? Dash, wheel, seating, everything. I grafted on a CTS-V hood scoop, and a newly fabricated lower fascia echoes contemporary styling. Same with the upper and lower mesh grilles. The new headlights are late-model BMW with the "halo" rings. Below are LED running lights with integrated turn signals. Oh, and those wheels are 19-inch 2016 CTS-V units to complete the package. 



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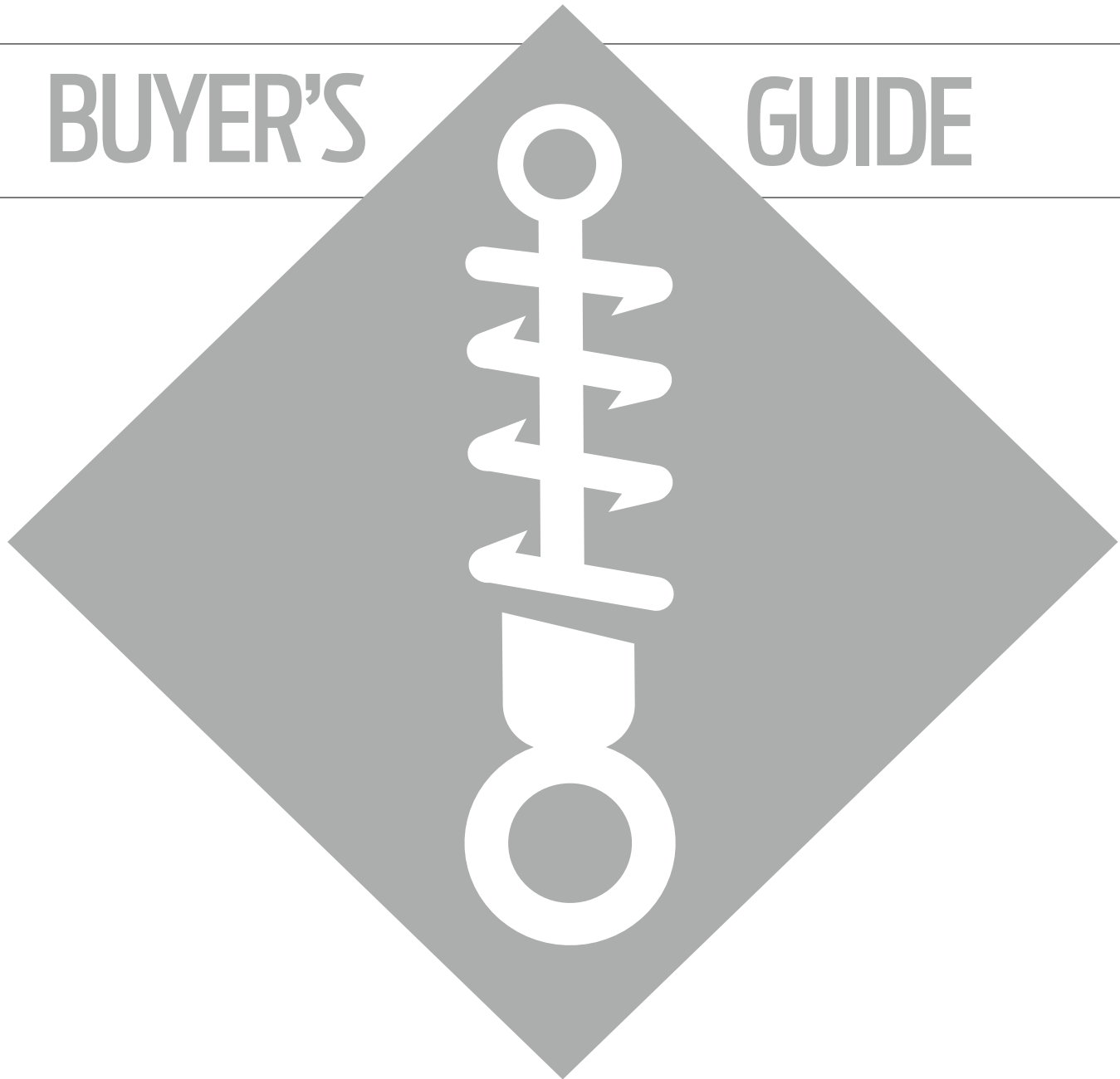
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CHASSIS & SUSPENSION

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GUIDE





Chris Alston's Chassisworks // 888.388.0297 // CACHassisWorks.com

Chassisworks' g-Bars and g-Links are the most adjustable and configurable performance rear-suspension systems available for popular 1960s and 1970s muscle cars. A broad range of components enables customization of the canted-4-bar suspension to perfectly suit your performance application, whether that's cruising slow and low to the car show on air suspension or hot lapping at an open-track or autocross event with high-end coil-overs. Component options include: poly-bushed or pivotball arms in tubular steel or billet aluminum; sliding-link or billet-arm antiroll bar; stock or narrowed width for mini-tubbed cars; and

factory-preset single-, double-, or four-way-adjustable shocks. In addition to shock and antiroll bar adjustments, multiple mounting positions for control arms and shocks allow optimal setting of suspension geometry and ride height. Complete systems start at just \$1,609 with applications for Camaro/Firebird 1967–1981, GM A-body 1964–1972, Chevy II/Nova 1962–1974, Mustang 1965–1973, and Cougar 1967–1970. Technical data sheet and system builder available online.



Chris Alston's Chassisworks // 888.388.0297 // CACHassisWorks.com

Gain tremendous cornering ability and greatly improved acceleration and braking response with Chassisworks' g-Link torque-arm suspension system. Engineered as a simple direct replacement for the factory leaf-spring suspension, the torque-arm system offers superior handling with multiple geometry and setting adjustments for further tuning and improvement. Each system is comprised of a fabricated torque arm, a pair of g-Link tubular-steel pivotball lower arms, a Watts link or panhard bar lateral locator, VariShock coilovers, weld-on frame brackets, and optional billet-arm, splined-end antiroll bar. To accommodate ultra-wide tire and wheel combinations, a mini-tub configuration is available with narrowed FAB9 housing, antiroll

bar, Watts link and offset lower arms. FAB9 housings ship factory-welded and ready to install. OEM housings (stock-width configuration only) are fitted with bolt-on axle brackets, but require welding for secure attachment of the torque-arm mount. Currently available for 1970–1981 Camaros/Firebirds with more applications coming soon.



Speedtech Performance // SpeedtechPerformance.com

Looking for the best off-the-shelf Pro Touring suspension on the planet? Speedtech has teamed up with veteran race-chassis builder Ron Sutton to create a totally new hardcore design, and we're proud to announce our new line of ExtReme suspensions that will take Pro Touring to the next level of serious handling performance. Using the latest in computer simulation, all aspects of this suspension's geometry were optimized and tested until the best possible numbers were achieved. Said Ron, "These designs are an upgrade from frankly any full chassis or subframe in the Pro Touring market today!" Features include:

Totally optimized suspension for street, autocross, and road-race driving; geometry numbers and strategies never before achieved; fully customizable to your vehicle and driving style; and designed for C10s, Camaros, Chevelles, Novas, and 1955–1957 Chevys.





Speedtech Performance // SpeedtechPerformance.com

Looking for a better ride and incredible handling in one complete package? Check out Speedtech's Road Assault complete front suspension upgrade kit. We're serious about parts that perform, and with leading design and engineering, this easy-to-install bolt-in suspension will completely change your car's attitude. At one low package price, this suspension is perfect for street cruising and weekend track days. Available for 1964–1977 Chevelle, 1967–1981 Camaro, 1968–1979 Nova, 1978–1988 GM G-body, and 1994–1996 GM B-body. Features include: Stronger and lighter tubular

control arms include improved geometry engineering, stainless steel offset milled cross-shafts, Delrin bushings, and heavy-duty ball joints; larger lightweight tubular sway bar improves cornering stability and uses Articulink end links for smoother operation; bolt-in Viking coilover shock conversion provides easy ride-height adjustment and double-adjustable shock valving; a billet tie-rod sleeves reduce flex and provide alignment accuracy.



Schwartz Performance // 815.206.2230 // SpeedtechPerformance.com

Schwartz Performance developed its G-Machine chassis to roll under a stock body, and in most cases, will bolt to the factory body-mount locations. The result is a robust foundation with a luxury car ride and sports-car-like handling. The front suspension is engineered with separate camber, caster, and toe adjustments (without using shims) and features needle-bearing-supported upper control arms. The rear suspension is a triangulated four-bar design with heavy-duty, Teflon-lined spherical rod-ends for

bind-free operation and a smooth ride. Not only do you get better handling performance and a lowered stance but the G-Machine chassis is designed to accept nearly any drivetrain combination from a big-block to modern powerplants. The Schwartz G-Machine Chassis package comes standard with 13-inch rotors and 6-piston calipers, adjustable coilovers, a full-floating Moser 9-inch with axles and a Truetrac posi, splined sway bars, power rack-and-pinion, and more!



Schwartz Performance // 815.206.2230 // SpeedtechPerformance.com

Build your unibody Ford, Mopar, or GM car on a solid foundation with a full frame G-Machine Chassis from Schwartz! Our G-Machine Chassis improves the overall handling performance of your ride and installs with little to no modification to the floorpan. Our rigid frame ties into much of the existing unibody structure, stiffening your vehicle and reducing weight by up to 75 pounds. All of the suspension and driveline components fasten to the frame to reduce body twist and frequencies. The front suspension is

a Schwartz-designed system with power rack-and-pinion steering, a splined sway bar, and needle-bearing-supported upper control arms. The rear features a full-floating 9-inch housing supported by a triangulated four-bar system, including a splined sway bar. Longer coilovers (16.5-inch) are used to deliver the best ride possible with outstanding handling capabilities. Our full frame allows nearly any drivetrain combination such as an LS, Coyote, or new Hemi to be installed easily. G-Machine



Chassis are available for Mustangs, Cougars, Nova, Camaro/Firebird, Mopar B- and E-bodies, and more.

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QA1 // 800.721.7761 // QA1.net/suspension

For the ultimate in suspension performance, QA1 has a tremendous selection of shocks, struts, and coilovers available with custom bearing or stock mounting options for a variety of Ford, GM, and Mopar applications. Choose from a variety of different coilover options that allow for easy ride-height adjustment, as well as non-coilover options. QA1 shocks and struts are offered non-adjustable, single-adjustable, double-adjustable, and drag "R" series valving options to dial in the perfect performance. The Pro Coil Systems include QA1's high-travel, American-made springs. All

QA1 aluminum shocks and steel struts are made with the highest-quality materials in their Lakeville, Minnesota, facility. They are 100 percent dyno tested and serialized to ensure they meet the highest quality standards.



QA1 // 800.721.7761 // QA1.net/suspension

Suspension is critical to the handling of your vehicle, and that's why QA1 prides itself on providing suspension components that are highly responsive, consistent, and affordable. QA1 has the most expansive line of bolt-on suspension components for your performance vehicle, including K-members, control arms, antihop bars, K-member braces, panhard bars, strut-tower braces, sway bars, toe links, torque and trailing arms, along with a variety of other products. These suspension components are designed to be interchangeable with either stock components or QA1 components. Our state-of-the-art fabrication facility

in Lakeville, Minnesota, manufactures all of our suspension components using nothing but high-quality, American-made materials. Available for a wide variety of Ford, GM, and Mopar applications, QA1 suspension components are designed to improve your hot rod's performance.



QA1 // 800.721.7761 // QA1.net/suspension

QA1 now offers performance carbon-fiber driveshafts for vehicles with up to 2,000 hp or with a max torque rating of 1,500 lb-ft. Available for many popular applications, these driveshafts are lighter, stiffer, and stronger than aluminum, steel, and other carbon-fiber driveshafts, all while providing dramatic safety benefits. While other carbon-fiber driveshafts are often made by cutting a premade tube to length, QA1 driveshafts are designed and manufactured

in-house at our Lakeville, Minnesota, facility using the latest filament-winding equipment. QA1 performance driveshafts utilize an exclusive 3M Matrix Resin for improved abrasion resistance and longevity, higher compressive strength, and minimal water absorption for increased torque capacity and longevity. QA1's driveshafts are currently offered in a 3.2- and 3.6-inch

diameter with several lengths and slip-yoke options to fit a variety of popular applications and are all custom-made to order.



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TECH DAY

Sunday, 9/13

**Gateway
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Madison, IL

- Gates open 9:00 am
- Tech until 5:00 pm
- Tune from 6:00 pm until 8:00 pm
- Tickets: \$15 for 13 and above/Children 12 and under free

RACE DAY

Monday, 9/14

**Gateway
Motorsports
Park**
Madison, IL

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Tuesday, 9/15

**Lucas
Oil
Raceway**
Indianapolis, IN

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Wednesday, 9/16

**Great
Lakes
Dragaway**
Union Grove, WI

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

RACE DAY

Thursday, 9/17

**Cordova
International
Raceway**
Cordova, IL

- Gates open 7:30 am
- Racing until 1:30 pm or until complete
- Tickets: \$10 for 13 and above/Children 12 and under free

FINALS

Friday, 9/18

**Gateway
Motorsports
Park**
Madison, IL

- Gates open 11:00 am
- Racing from 2:30 pm to 8:30 pm or until complete
- Tickets: \$15 for 13 and above/Children 12 and under free

HEADS-UP!

Saturday, 9/19

**Gateway
Motorsports
Park**
Madison, IL

- Gates open 9:00 am
- Racing from 11:00 am to 3:30 pm or until complete
- Tickets: \$15 for 13 and above/Children 12 and under free

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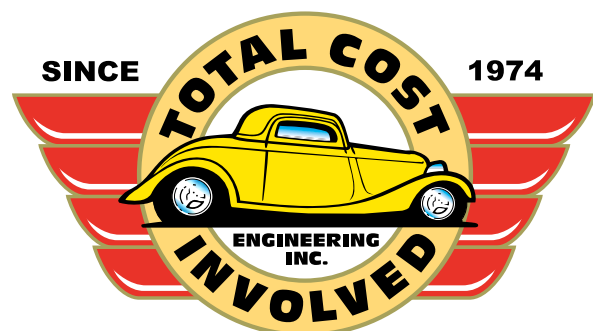
Reilly MotorSports, Inc. // 570.443.7440 // ReillyMotorsports.com

Reilly MotorSports' AlterKtion front suspension system for Mopars does more than save weight and add clearance. It's designed with precise geometry for optimum control, excellent ride quality, and easy installation and maintenance. Durability is second to none, and they've been tested tough for years of use in everything from daily drivers to road course to 7-second strip cars. Easy to install and work with, the AlterKtion system bolts in to factory framerails. The system includes manual or custom-valved power rack, multiple sway-bar options, double-adjustable shocks, trailer tie-downs, engine mounts for 318-440, Hemi, third-gen Hemi, or LS, fully powdercoated and ready to install.



Reilly MotorSports, Inc. // 570.443.7440 // ReillyMotorsports.com

Reilly MotorSports' Street-Lynx triangulated rear suspension system for Mopars is engineered to provide excellent handling, traction, and ride quality, while perfectly fitting within the confines of the stock undercarriage, gas tank, and off-the-shelf 3-inch exhaust systems. With no cutting needed and only minor welding, it can be installed at home in just hours. Double-adjustable shocks, adjustable bushing links, trailer tie-downs, powdercoating, even the spanner wrench is all included standard. The 8.75- or 9-inch housing and axle packages are available and include all brackets fully welded, vent, brake hose, drain plug, and powdercoated for an even easier installation.



Total Cost Involved Engineering, Inc. // 866.925.1729 // TotalCostInvolved.com

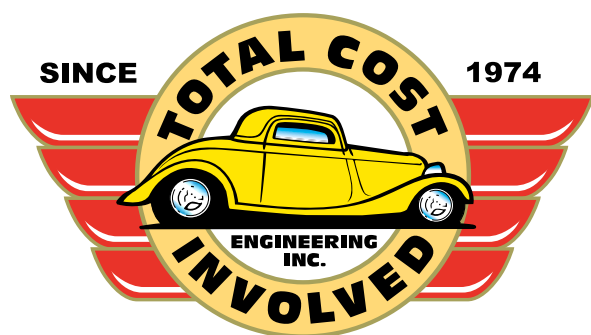
This Custom Independent Front Suspension clip includes a double rail support, two-crossmember design that provides superior strength with higher durability. Custom IFS is heli-arc welded from American Made metal for the highest-quality strength. GM

engine mounts are designed to accept GM small-block, GM big-block, and GM LS engines. Bolt-in multi-position transmission mount is included, polyurethane bushings, heavy-duty tubular A-arms, spindles (2-inch drop), power rack-and-pinion gear, GM disc brake

kit, black powdercoated springs, RideTech single-adjustable coilover shocks, and transmission mount. For more information, about this great suspension products please visit.



SPECIAL ADVERTISING SECTION



Total Cost Involved Engineering, Inc. // 866.925.1729 // TotalCostInvolved.com

Introducing the new Total Cost Involved Engineering 1964 1/2–1970 Mustang Custom IFS Package. This suspension package is designed to lower the stance, dramatically improve handling and braking, and also opens up the engine-compartment area for header

clearance and big-block engine installs. The custom IFS is a weld-in product that comes with frame reinforcing plates and inner fender panels, crossmember, shock mounting towers, urethane bushed tubular A-arms, TCI custom spindles, steering arms, power rack-and-pinion

steering, coilover shocks, and 11-inch disc brakes with OEM calipers. Let TCI turn your classic mustang into a corner-hugging, stop-on-a-dime Pro Touring car.



Aldan American // 310.834.7478 // AldanAmerican.com

Aldan American coilovers deliver 34 years of on-road and track-tested performance. Made in Los Angeles, California, we use high-strength 6061 T6 billet aluminum providing a lighter-weight and cooler-operating coilover. Our new internal piston and seal designs offer our most consistent and best riding coilover to date. All Aldan coilovers allow for adjustable ride height, making it easy to get that perfect stance every time. We offer the widest selection of mounting, coil-spring lengths, and valving adjustments tailored

to you and your vehicles needs. Aldan coilovers ship fully assembled, ready to bolt into your IFS/IRS, Mustang II or custom chassis application. All Aldan American coilovers are factory serviceable. Experience improved handling and comfort with Aldan American Coilovers. For a free catalog, please give us a call or visit our website.



Aldan American // 310.834.7478 // AldanAmerican.com

Now available through the Aldan American Custom Shop, we bring you our new Regulator Series: single-adjustable, black-finish coilovers. Built to perform and handle, Aldan Regulator Series coilovers are CNC machined from aircraft-grade 6061 T6 billet aluminum. After machining, we hard anodize each component Midnight Black for a durable, show-stopping finish. Regulator Series coilovers feature low-profile adjustment knobs for precise rebound adjustments. All Aldan American coilovers are interchangeable between

poly bushings or spherical bearings. For the ultimate matched coilover set, choose from our wide selection of cold-wound, gloss-black powdercoat, or show-quality chrome coil springs. All Regulator Series coilovers are factory serviceable. Limited runs of Aldan American Regulator Series coilovers will be available for 2015. Give us a call to reserve your set today. AldanAmerican.com search: REGULATOR.





ROADSTER SHOP

Roadster Shop // 847.949.7637 // RoadsterShop.com

The Roadster Shop Fast Track chassis offers unmatched strength and performance combined with intricate detail and show-car craftsmanship. If you are looking for the proven best of the best, look no further. Complete chassis are available for all popular Pro Touring muscle cars like the pictured 1967–1969 Camaro, as well as most classic 1950s–1960s Ford and GM cars and trucks. All Fast Track chassis are engineered to give you the best of both worlds with

smooth, comfortable ride and unrivaled track performance. Standard features include fabricated, fully boxed framerails, TIG-welded crossmembers and chassis components, Penske coilovers, splined sway bars, power rack-and-pinion steering, motor and trans mounts, and four-bar rear suspension with 9-inch housing and axles. Each chassis can be upgraded with our Elite Series billet



IFS (shown), multiple big-brake packages, coilover upgrades, and the Roadster Shop's race-proven Fast Track IRS.



ROADSTER SHOP

Roadster Shop // 847.949.7637 // RoadsterShop.com

A revolution in ride quality and street-performance handling can easily be obtained for the 1955–1957 Chevy, thanks to the Roadster Shop REVO chassis. Fabricated one-piece 4x4-inch framerails provide the strength to eliminate common body flex. All factory mounting locations are CNC located to ensure a simple bolt-on installation. An aggressive lowered or stock height are available to get each Tri-5 owner the exact look they are after. The REVO IFS has been designed from scratch using the latest CAD software and design

processes. More than 115 unique components were designed and manufactured for this suspension, allowing a fresh approach to build the ultimate IFS without compromise. The REVO IFS is set apart from the rest with its large-diameter control arms, OEM eccentric-style adjusters, thru-frame splined sway bars, and sculpted TIG-welded crossmembers. REVO chassis



are also available for most 1940s–1960s Chevy and Ford cars and trucks.



Art Morrison Enterprises Inc. // 800.929.7188 // ArtMorrison.com

Art Morrison Enterprises is now offering a revolutionary IRS suspension package for all of its chassis and subframes. The low-profile design will allow for an under-the-stock-floor location on most of the bolt-on GT Sport chassis and subframes, while the suspension cradle will allow for easy installation and provide an extra level of noise and vibration dampening. Utilizing a Dana 60 ring-and-pinion gear, along with custom drive axles, the AME Sport IRS is capable of withstanding the abuse of

1,800-plus-horsepower engines. The unique design of the AME Sport IRS actually is a significant increase in both comfort and performance over solid axle designs and other currently available IRS systems. The key performance is its adjustable toe curve, which actually helps the vehicle “steer” around corners. This enables the driver to corner harder than ever before without ever feeling out of control.



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Art Morrison Enterprises Inc. // 800.929.7188 // ArtMorrison.com

Art Morrison Enterprises is offering its line of GT Sport high-performance replacement chassis for the 1949–1954 and 1955–1957 Chevrolet, 1953–1962 Corvette, 1947–1953 Chevrolet truck, 1959–1964 Impala, and 1964–1972 GM A-body. It features all of the necessary body mounts and bumper mounts, as well as the core support and engine/transmission mounts. Available complete with power rack-and-pinion steering, performance-tuned independent front suspension, triangulated four-bar rear suspension,

and 9-inch housing. The GT Sport Chassis also utilizes adjustable front and rear antisway bars and adjustable coilovers so you can easily dial in the chassis to the level of desired performance. Designed with the home builder in mind, these chassis are a true bolt-in replacement that will dramatically improve the ride and handling of your classic car.



Viking Performance // 952.469.4130 // Vi-king.com

Viking Performance, Inc. is excited to announce its expanded offering of made-in-the-USA, double-adjustable shocks for drag racing, street performance, and hot rods. Viking offers the largest selection of bolt-in stock-mount and custom-mount shocks in the aftermarket, including new GM and Ford front coilover

kits. Viking also offers new rear coilover conversion kits for many popular applications. Kits are available for vehicles of any stance, including those dropped, at factory ride height, or raised. All Viking shocks are lightweight aluminum with a sleek clear anodized finish and feature independent compression and rebound

adjustment for the ultimate in performance and ride quality. Viking shocks are rebuildable and revalveable, and have a two-year warranty. Every shock is handbuilt in our Lakeville, Minnesota, facility, dyno tested, and serialized. Shocks come complete with mounting hardware.

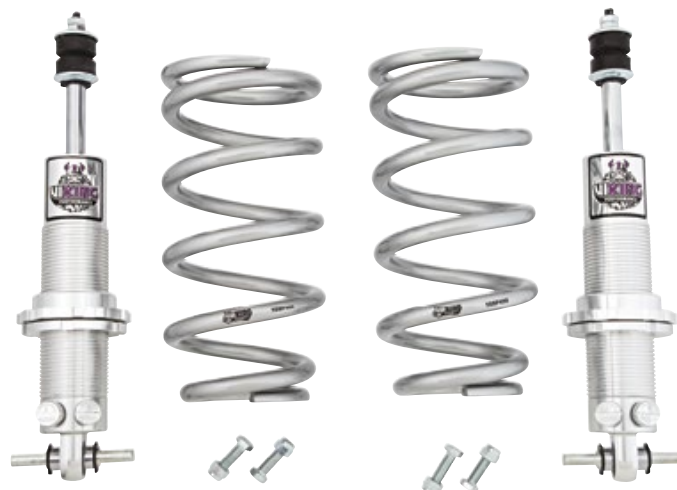


Viking Performance // 952.469.4130 // Vi-king.com

Viking is pleased to announce that it now offers bolt-in coilover conversion systems for many popular applications, such as GM A-, B-, F-, and G-body applications, as well as the Mustang Fox-body and SN95. The made-in-the-USA rear coilover conversion kits include double-adjustable shocks; high-travel

springs; a high-quality, bolt-in, mounting-bracket system; spanner wrenches; thrust bearings; and all hardware. Kits are available for vehicles of any stance, including those dropped, at factory ride height, or raised. Viking's double-adjustable shocks are lightweight aluminum with a sleek, clear anodized

finish and feature independent compression and rebound adjustment for the ultimate in performance and ride quality. Viking shocks are rebuildable and revalveable, and have a two-year warranty. Every shock is handbuilt in our Lakeville, Minnesota, facility, dyno tested, and serialized.





Classic Performance Products // 888.522.8305 // ClassicPerform.com

CPP now offers a high-quality direct bolt-in hydraulic brake booster kit designed to upgrade manual or vacuum-assisted brakes with a powerful and compact modern hydraulic assist unit. These systems include everything you need to install into your vehicle. Most installations can be accomplished in an afternoon, using common handtools, with average mechanical skill levels. These systems consist of a direct-fit, high-performance, hydraulic brake assist unit (with options for steel or billet aluminum firewall mounting bracket);

braided stainless or rubber, high-pressure line set; heavy-duty power-steering return line; pedal rod hardware; and mounting hardware. Using all-new parts, this unit puts out an amazing 1,800 psi at the wheels! The "Show Stopper" package includes: Hydraulic Brake Assist unit with billet aluminum firewall mounting bracket, #MCPV1 master cylinder, chrome accumulator cover, stainless pressure hoses, rubber return hoses, and all necessary fittings and hardware for installation. The "Street Beast" (shown) package



includes: Hydraulic Brake Assist Unit with steel firewall mounting bracket, aluminum Corvette-style master cylinder, side-mounted Prop & Stop Block kit, rubber pressure and return hoses, and all necessary fittings and hardware for installation. Bare Units are Hydraulic Assist only, master cylinder and hoses are not included. Available for 1960–1987 C-10, 1955–1970 fullsize Chevy, 1962–1974 Nova, 1964–1972 Chevelle, 1967–1981 Camaro, and 1978–1987 GM G-body. Bare units start at \$469 and complete systems start at \$829.



Classic Performance Products // 888.522.8305 // ClassicPerform.com

Are you ready to put an LS engine into your classic? Classic Performance Products, Inc. introduces their new FitRite™ LS Engine Adapter Bracket Kits to help with your project. CPP's long adapter kit allows the engine to move from 1/2-inch rearward (great for oil pan to crossmember clearance) up to 3-inch forward for a full 3 1/2 inches of travel with a completely custom range of positions. Classic Performance's exclusive short adapter kit is a smaller, more compact version, moving the engine from 2 1/4-inch forward to 3 3/4-inch forward

for a total of 1 1/2 inches of travel. CPP's exclusive design no-weld brackets are CNC laser-cut steel and features a durable black powdercoat finish. FitRite™ kits include POLYPLUS™ engine mounts. Kits start at \$129. All CPP parts have lifetime warranty.



Jamco Suspension // 951.549.1441 // JamcoSuspension.com

Jamco's all-new tubular A-arm ball-joint conversion for the 1949–1953 Ford and Mercury cars. This all-new kit includes: new powdercoated tubular upper and lower A-arms with ball joints installed, disc brake and spindle kit, new coil springs, and new shocks. No more having to tear down your car and send in your A-arms to be converted. Complete kit is bolt-on. No cutting or welding is required. New spindles will drop the car about 1 inch. Coils are available as stock, 1-inch, 2-inch, or 3-inch drop. New shocks will match height of coils. Part numbers: DUC002F = 1949–1953 Ford; DUCM491 = 1949–1951 Mercury; DUC002M = 1952–1953 Mercury.





Performance Online // 800.638.1703 // PerformanceOnline.com

Performance Online's new tubular control arms for the 1970–1981 Chevy Camaro feature support tube to triangulate the construction, making them ultra-strong. Control arms have ball joints pre-installed, so there is no need to run to the machine shop. Kit includes: front (5160 alloy spring steel) coil springs available in a stock height or 1.5-inch drop; front shocks (three-way adjustable); upper and lower tubular control arms, 1020 DOM tubing (added caster for increased performance, with heavy-duty construction to eliminate deflection); upper and lower ball joints; upper and lower control-arm bushings (Delrin); and upper and lower cross shafts. Part number: S3SK708.



EIBACH // 951.256.8300 // Eibach.com

If you live for the corners, the Eibach PRO-PLUS Performance Handling Package delivers. Eibach PRO-PLUS packages include our legendary Eibach PRO-KIT springs along with matching ANTI-ROLL-KIT sway bars. The Eibach PRO-KIT lowers your car's center of gravity, reducing squat during acceleration, body roll in corners, and excessive nose-dive under braking. With the Eibach PRO-PLUS installed, you will immediately experience more precise turn-in response, improved handling, and enhanced cornering grip—in any performance-driving situation. The Eibach PRO-PLUS is designed and tested to work well with either factory or aftermarket performance dampers. Matched performance springs

and sway bars = superior handling for the serious enthusiast, stop quicker and corner faster, excellent ride quality, and million-mile warranty. Visit Eibach.com for modern muscle-car applications and components for: Camaro, Challenger, Charger, Mustangs, and more.



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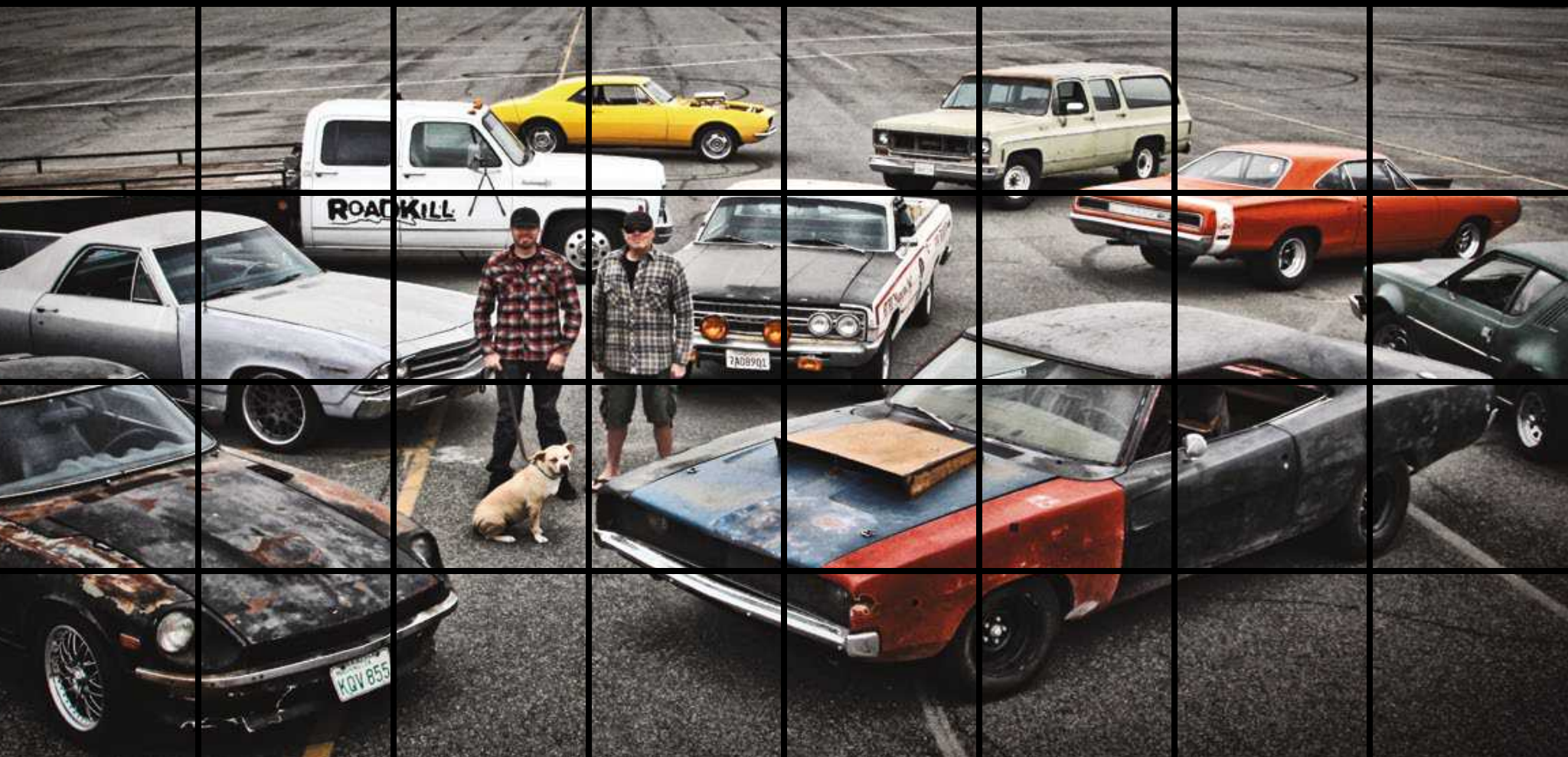
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With enough money, you can build exactly what you see in your perfect imaginary garage, but who ever has enough money? Part of hot rodding is knowing when to compromise. Sometimes if you don't settle, you'll never get back on the road.

We recently redid the seats in my 1969 Dodge C-body. Thanks to a fellow Polara owner, I was able to replace the front bench seat with a set of "500" buckets. Way sportier, plus the separate seat arrangement means I can be up against the wheel while my passenger can sit back and enjoy all the fullsize Dodge legroom.

The seats needed to be recovered, which led to compromise number one: There was only enough money to do the front. The back, which was still in good shape, we left in the original vinyl. Unsurprisingly, there isn't a huge demand for green C-body vinyl, and N.O.S. material, if you can even find it, is upwards of \$40 a yard—and a Polara seat is at least a football field's worth of yards. Besides, I wanted cloth because I'm tired of sticking to the seat every summer. So now the front and rear don't match, which has always bothered me.

I also spent hours worrying that the green dye for the headrests and seatbacks was too dark, and the vinyl surrounding the cloth inserts was too light. I finally settled down, we installed the seats, and you know what? They're great. They may be multiple shades of green, but so is the rest of the interior, and that's stock! I could have sat in the torn, old seat for years, waiting for the perfect replacement, but it's a lot more fun to be out there driving.

➤HOTROD.COM/Elana-Scherr

[Ever heard that Johnny Cash song, "40 Shades of Green?"]



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There's only one place to consistently get a feel for the look and style of a car. It's not on a turntable or displayed inside with colored lights. The best place to view a car is on the road, and I would add, specifically, on the highway.

A highway is the only place to see a car moving and be able to drive around it. You can speed up or slow down to view it from all angles. The car is in its natural environment and you get the true sense of vehicle proportions and stance with sunlight dancing around picking up highlights and surface developments.

Car shows, on the other hand, display a car statically—parked, raised on a turntable, or jacked up on one side with the wheels off, hood, doors, and trunk lid open so you can see the detailed suspen-

sion and other zoomy features. But it's also the most unnatural and difficult way to get the sense of proportion, as well as the car's overall design and feel. In other words, it's the worst way to look at a car meant to be seen.

Through the years, there have been derogatory terms like "show queen," "building barge," and "all show and no go" applied to show cars to add to the silliness of the experience. My buddy, Dan Webb, who has won the Ridler Award at the Detroit Autorama and built some unbelievable cars, has always joked about a solution. He thinks the cars in contention for the America's Most Beautiful Roadster award, Ridler award, or whatever should line up outside on Saturday and then be driven somewhere. Maybe to the beach or the In-N-Out Burger a few miles outside town—far enough to see how these cars look and function as—well, as *cars*. Everyone gets to view them where they display best: on the road. I think it's a fantastic idea and should be included in all prestigious shows.

It can be the show within the show, and there could be a lot of pomp and publicity about it for added value and a bit of drama, too. Those cars making it to the destination and back continue for the award, and those that crap out are disqualified. No more chrome brake discs and cars barely able to get out of their own way, or incomplete cars slapped together to look like actual, functional cars. Who will be the first promoter to make this an integral part of their next show?

➤ HOTROD.COM/Thom-Taylor



Dries the best



What Are the Clues You May Have the Wrong Cam For the Application, and What Can Be Done to Fix It?

The camshaft is the heart of your engine. Assuming your engine is otherwise sound and correctly tuned—but doesn't perform as expected—it may be because the cam is mismatched to the overall engine and drivetrain combination. The experts at Comp Cams developed this handy troubleshooting list. Based on typical engine symptoms, it includes the probable cause, as well as solutions for each problem.

HOTROD.COM/Marlan-Davis

SYMPTOM	CAUSE	SOLUTION
Power brakes and other vacuum accessories don't function properly, and/or there is a rough and unstable idle.	Camshaft has excessive overlap.	Going to a wider lobe-separation angle (LSA), less duration, or a combination of both decreases overlap and results in increased vacuum and greater idle stability. Very low-rpm throttle response will also be improved.
Vehicle is sluggish at low- to mid-rpm, but runs great as engine speed increases.	Camshaft is too large.	Intake closing and exhaust opening points greatly effect low-end performance. Going to a smaller cam will help the low end. Tightening the LSA while decreasing duration may help even more, but tighter LSAs have a negative effect on idle stability.
Sharp power drop-off at high engine speed.	Valvetrain dynamics issue or exhaust-side pumping losses.	There are two different reasons power can drop quickly at high rpm. If the power drop is accompanied by clashing noises, it is likely a dynamic issue and will require either a smoother cam profile or better-matched valvesprings. If the engine sounds fine, it's likely due to late exhaust opening. More exhaust duration on a wider LSA will open the exhaust earlier and help the engine carry power at high speed.
Good low- and high-speed performance, but engine is not as strong as expected in the midrange; or engine performs OK everywhere, but not as well as expected.	Overlap problem or mismatched components.	Insufficient overlap prevents exhaust headers from working effectively. Also, if the heads flow well at low rpm but the cam is designed to work at high rpm, the result can be a flat, lazy torque curve. Start by examining the combination and if everything "matches," try going to a tighter LSA or more advance.
Power peaks earlier than expected, then gradually falls off to the engine redline.	Camshaft is too small.	The cam may need to be larger on the intake, on the exhaust, or both. With a solid cam, run a lash loop to see if tightening the lash (increasing the valve duration) helps. Also try different rocker arm ratios.
Power curve goes up strong to a certain level, then levels off for the next 1,000 rpm or more before falling gradually.	Restrictive intake or exhaust hinders airflow.	Changing cams probably won't help this problem, but sometimes more duration can help. If available, look at the dyno or airflow numbers and see if they go up to a given number and stop. If so, there is likely a restriction in the inlet or exhaust tracts.

Contact

COMP CAMS; Memphis, TN; 800.999.0853 or 901.795.2400; CompCams.com



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The Camaro, owned by Angelo Vespi, is a virtual showcase for ARP fasteners. In fact, it was in ARP's booth at the SEMA Show.

In addition to the head and main studs, rod bolts and various other ARP

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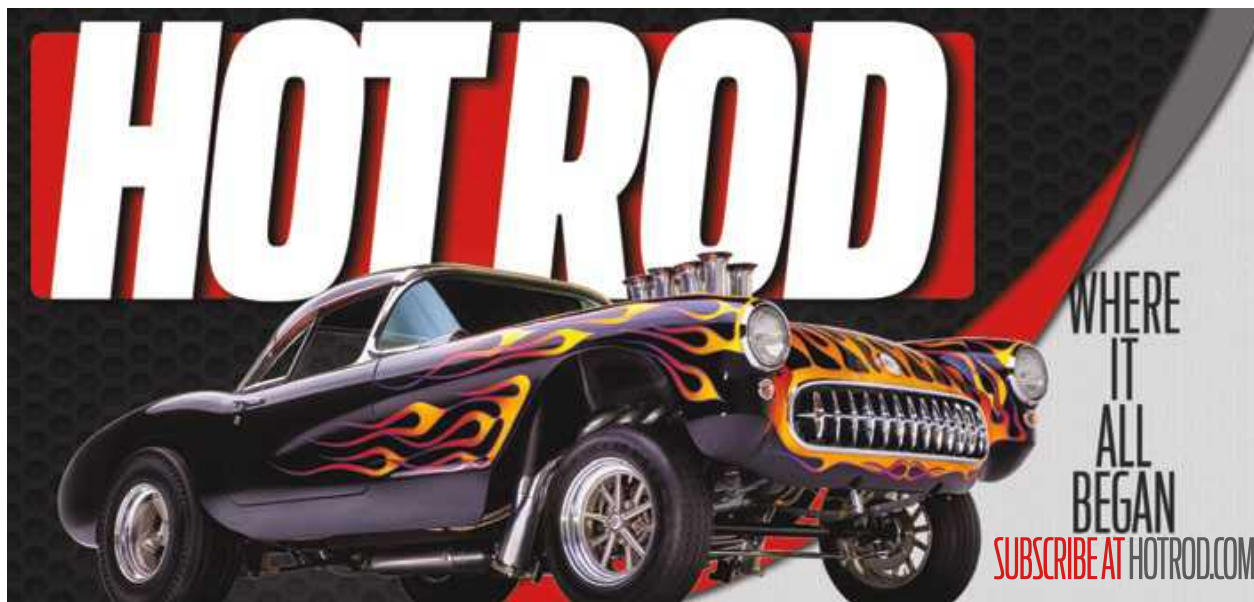
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✍ Marlan Davis 📷 Norm Brandes, Will Anderson, and Fel-Pro

THE COMBO

Rob Van Vleet has certainly been through the ringer when it comes to Olds V8 engines. The Machesney Park, Illinois, hot rodder had gone through at least four of them, continually spinning bearings until we rescued the car. As seen in our June 2015 HOT ROD Rescue article, Norm Brandes solved the spun-bearing problem by tightening up the bearing clearances and controlling oil flow to the top end. This being HOT ROD magazine, we decided the top end needed an upgrade to support all those added cubes, as well as bring the motor into the 21st century. In went a modern, custom-ground, Howards hydraulic roller cam; Mondello aluminum heads; and 11:1 Diamond forged pistons. The engine ended up pounding out 591 lb-ft of torque at 4,000 rpm, with 525 hp on tap at 5,200. It made more than 500 lb-ft starting as low as 2,800 rpm. And those dyno results were obtained after Van Vleet put several thousand miles of street driving on the car, including

running part of 2014’s Power Tour®. Those daily driver miles, as well as the engine dyno flog, were fueled by 93-octane unleaded pump premium, apparently verifying Brandes’ high-compression, pump-gas, street-motor theories.

THE PROBLEM

But then we became victims of our own success. “At this point, we had all the good baseline data and were just exploring the limits,” Brandes says. “We wanted to see how low torque was coming into the engine, so we made a pull starting at 2,500 rpm, instead of the normal 3,000 rpm. On the last dyno pull, a brief puff of steam was observed and oil pressure dropped 10 psi. The spark plugs looked fine, there was no visible external leaks, and no bubbles in the coolant.” Brandes did a cylinder-leakdown test. Seven out of eight cylinders were at 1 percent leakdown, but cylinder No. 7 had jumped to 8 percent. “We stopped testing and tore down the engine. It turns out we had found our limit.”

THE DIAGNOSIS

The sudden, 10-psi oil-pressure decrease was potentially the most serious issue because it indicated a possible bottom-end problem. Upon inspection, the main and rod bearings exhibited only slight (but normal) wear with no distress and no evidence of detonation. “The hydrodynamic oil wedge was still holding up fine,” Brandes says. But the main-bearing clearances had started to progressively increase front to rear from the engine’s as-machined condition. “From the torque we were generating, the main caps were moving around. As you move to the rear, it gets worse, because the force is cumulative from the front cylinders. It’s a known problem on high-output Olds engines, with their relatively weak two-bolt-main bottom ends. We thought we could get by on a street engine, but we made more torque than expected.”

Analysis of the bearings by Federal-Mogul engineers confirmed that, other than the clearance increase, “there were no signs of distress or a lot of

metal-to-metal contact that would indicate incipient failure. It would have been acceptable to put these bearings back into service.”

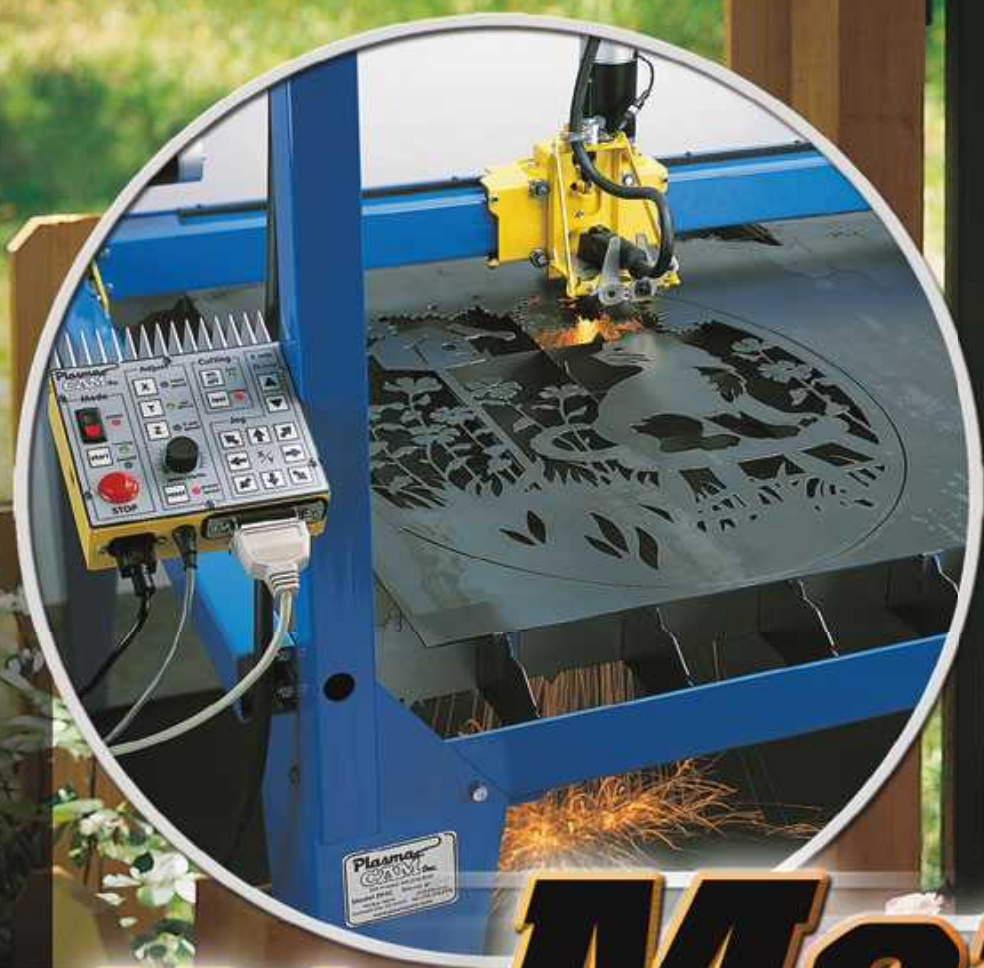
What are the long-term implications of this clearance increase? According to Brandes, “If the engine had continued to run at the max stress level as it did during the engine dyno-test, there would have been an increasingly severe oil-pressure problem. In Rob’s everyday driving mode, he can only use 400 to 450 hp because his chassis can’t hook up, so the engine saves itself. But I don’t like skating by.”

No. 7 cylinder’s higher-than-desired leakdown was traced to a worn valvetrain. “At peak torque, there’s a lot of pressure exerted on the guide, a lot of lateral thrust,” Brandes explains. “Never skimp on the valve guides.” Brandes replaced all the guides and refreshed the valve job.

Teardown also revealed a head-gasket issue. Brandes saw some distress and deformation around one cylinder’s fire ring. Although the head gasket had not “blown” (outright sealing

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[Westech's Norm Brandes and Jim Daley (shown) worked with Federal Mogul and Fel-Pro engineers to solve Van Vleet's latest problems.



[The big fix: stabilizing the weak Olds two-bolt-main bottom end with Mondello Performance's Halo main-bearing girdle.



[Incorporating modern 21st-century engine-building tech into a now proof-tested combo gives new life to an Olds combination.

failure), the engine did experience momentary head lift. However, the gasket resealed and there was no damage to either the block or cylinder-head deck surfaces.

Brandes explains, "The cylinder pressure was great enough to cause a problem. The timing curve in the distributor was set up for what worked in Van Vleet's Cutlass, generated by testing on my Mustang chassis dyno. We had 29 to 30 degrees total timing at 2,500 rpm, which worked fine in the car where the gears pull it through the low-rpm/high-torque area quickly. But an engine dyno sweep test is a timed constant acceleration rate. You have higher initial torque loads when the brake first comes in, and the engine doesn't accelerate through the danger area as quickly." To duplicate the real-world issue in-car, Brandes says, "Van Vleet would need to have an Airstream trailer on the back of his Cutlass, and then step into it at 2,500 rpm in high gear."

Brandes sent the head gaskets back to Fel-Pro for evaluation, where its engineers found what they say is "evidence of combustion gases leaking past the combustion seal in the gasket." After measuring the gaskets for thickness and bore-opening size, Fel-Pro found the gasket had not compressed to its designed thickness, indicating insufficient



[Clockwise, from top left: After June 2015's dyno flog, Brandes tore the motor apart, observing some combustion-chamber leakage across the head gasket fire ring (circle), likely from slight detonation at 2,800 rpm. Diamond's pistons weren't damaged. The big issue was the bottom end: Rear main-bearing clearances had increased from the as-machined condition. However, the bearings themselves show only normal wear and could have been reused.

clamp load. There was also bore distortion in the intake-to-exhaust direction, indicating some detonation had occurred. Fel-Pro explains, "This stretching of the bore opening is a good indication the engine had been run with detonation. Detonation causes large spikes of cylinder pressure, resulting in the cylinder head lifting from the block, unloading the gasket. Insufficient clamp load will make this situation worse."

Fel-Pro engineers went to work figuring out how to obtain the gasket's design clamp load. Meanwhile, Brandes slightly revised the ignition curve to bring in the distributor's centrifugal advance slower as tested on the engine dyno.

THE FIX: BOTTOM-END

In the Olds community, it's pretty much a given that if a

production-based Olds V8 consistently makes more than 500 hp and 500 lb-ft, the bottom end needs more support. The major alternatives are either billet-steel, four-bolt, main-bearing caps with splayed outer bolt holes or stabilizing the existing two-bolt main caps with an add-on support girdle. Aftermarket four-bolt conversions are the ultimate solution for production-based two-bolt-main Olds blocks, but the machining is more complex, plus the parts themselves are costlier than Brandes' selected choice: Mondello Performance's Halo Support Girdle (PN SG-490).

The Halo girdle fits over the top of the main caps, clear-

These Olds main caps are made for walking, and that's just what they'll do. One of these days these caps are gonna walk all over you." — Norm Brandes



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ing most oil pans without the need for machining the pan rails. There are trick (and more expensive) girdles that bolt to modified oil pan rails as well as the caps, but that requires a special, custom oil pan and an extended oil-pump pickup screen.

Halo girdle machining starts by machining the front and rear valley bulkheads square. The block is then flipped upside-down. The machinist equalizes the main-cap register depth, mills flat the main-bearing caps' top surfaces, and (with the girdle installed and torqued-down) line-bores the block. Be sure to mock up the entire rotating assembly to ensure it clears the oil pan, the block's side rails,

MAIN CAP CLEARANCES

All dimensions in linear inches or fractions thereof. "Yellow"-tinted cell is "marginal"; "Red"-tinted cells are out of range; or, as Brandes puts it, "We're at DEFCON 1 here."

NO.	PHASE 1 BUILD (NO GIRDLE)		PHASE 2 BUILD (WITH GIRDLE)	
	AS-ASSEMBLED	1ST TEARDOWN	AS-ASSEMBLED	2ND TEARDOWN
MAIN BEARING BORE ID				
Official big-block Olds machining acceptable range: 3.1880–3.1890				
Brandes/Westech preferred machining acceptable range: 3.1880–3.1885				
1	3.1882	3.1883	3.1881	3.1882
2	3.1882	3.1884	3.1881	3.1882
3	3.1883	3.1887	3.1882	3.1883
4	3.1882	3.1891	3.1881	3.1882
5	3.1883	3.1894	3.1882	3.1883

MAIN BEARING CLEARANCE

Brandes/Westech preferred main bearing clearance (except No. 5): 0.002–0.0028

Brandes/Westech preferred main bearing clearance (No. 5): 0.0025–0.0032

1	0.0022	0.0022	0.0023	0.0026
2	0.0026	0.0026	0.0024	0.0025
3	0.0027	0.0027	0.0025	0.0025
4	0.0025	0.0033	0.0024	0.0026
5	0.0029	0.0041	0.0026	0.0029

the connecting rods, and the oil-pump body, retention bolt or stud, and pickup screen.

THE FIX: HEAD GASKET

In its engineering lab, Fel-Pro experimented with a new head-gasket tightening procedure under controlled conditions with the goal of properly and safely realizing the desired head-gasket clamping load factor. Engineers raised the ARP stud-nut tightening torque value from the published 80 lb-ft to 90 (in ARP assembly lube), creeping up to it incrementally using a three-step tightening interval. Additionally, a special "time-out" and individual stud-nut retorquer proce-



01] To stabilize the bottom end, Westech machined the block for a Mondello Halo support girdle. The first step is squaring the front and rear cam valley bulkheads (aka "China Walls") on the Bridgeport mill, as the block will rest "upside-down" on those surfaces during the bottom-end machining process.



02] With the block now flipped upside-down, a cutting tool is set up at a known height in the end mill and traversed front to rear to check the main cap registers' height and squareness. The goal, Brandes says, "is to ensure the block is square in the mill."



03] Once the block is square, the bore measurements, alignments, and register heights are carefully noted. The cap registers are corrected and machined down in the end mill to the height of the lowest register.



04] The main caps' top surfaces where the new girdle will sit are squared-up and rough-milled flat.



05] But are they still flat as-installed in the block? The initially rough-cut caps are installed in the newly squared registers and checked with a dial indicator to determine the final amount of material that needs to be removed from each.



06] Because its final height must compensate for the thickness of Van Vleet's oil-pump baffle that sandwiches between the girdle and rear cap, the rear (No. 5) main cap is machined separately.

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ture was specified after initial assembly to compensate for a gasket and fastener's inevitable tendency to relax after initial tightening. Later, after breaking the motor in, Brandes went around the pattern one last time, checking the nuts were still holding at 90 lb-ft. This procedure works without yielding the stud; ARP's published tightening specs are generally considered conservative, intended to provide a safety margin for those whose torque wrenches are not properly calibrated. "You have some leeway to increase the specs if you know what you are doing and your equipment is properly maintained," Brandes says.

THE RESULTS

Brandes reassembled the engine with the girdle and the new head-gasket tightening proce-

ture. He also put in new main and rod bearings to start with a clean baseline for evaluating any distress. The engine was retested on Advanced Engine Concepts' Stuska engine dyno. Initially, a new problem developed: "The engine started breaking up," Brandes says. "We tightened up the spark-plug gaps from 0.045 to 0.035 inch and the problem went away." This remains mysterious, because there were no issues during the previous test session.

With the ignition cleaned up, the Olds made virtually the same peak numbers as the previous test session, but it did gain about 5 lb-ft and 4 hp on average. There's a good chance it was capable of generating even higher output, but now the carburetor was holding back: The 481ci mill's 830-cfm Quick Fuel carb was pulling more than 3



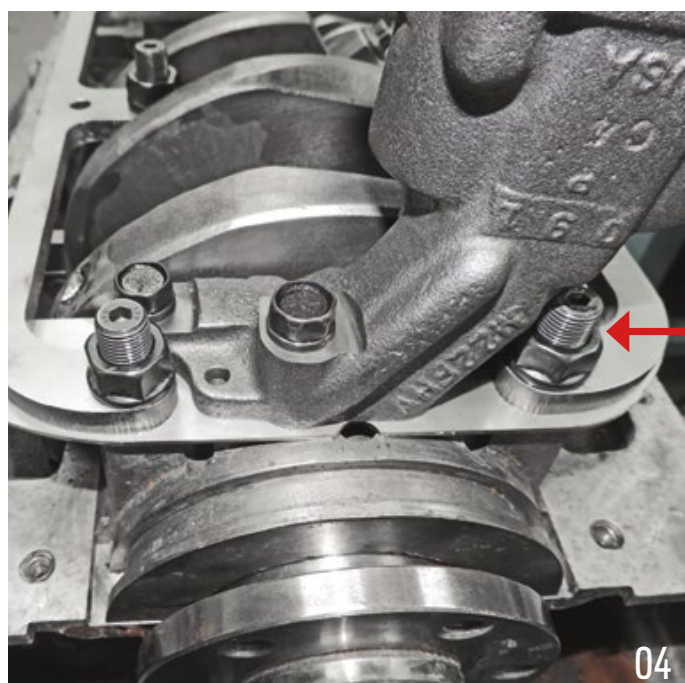
01 The now equal-height caps are installed on the block, ready to accept the new girdle. Mondello includes new, slightly longer ARP studs to compensate for the girdle's higher stack height.



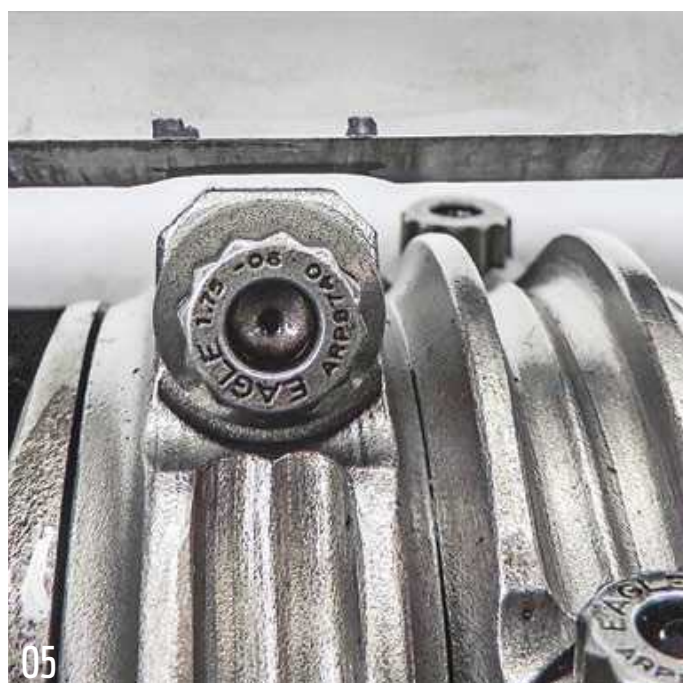
02-03 The girdle and (at the rear) oil-pump scraper are installed and properly torqued. Westech then uses a BHJ line-boring fixture to finish the main bearing bores straight and true. BHJ says this tooling can be used in a common vertical mill.



04 After machining, mock up the rotating assembly and bolt-down the oil pump. Make sure everything clears. On this motor, there was no interference, although one stud nut (arrow) does get pretty close to the oil pump body. A 12-point nut would provide more clearance if needed.



05 Cycle the completed rotating assembly by hand, checking for connecting-rod big-end or bolt interference. On Van Vleet's engine, slight clearancing was needed between the girdle and several connecting rod capscrews on the passenger side.



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01 inches of vacuum on the top end, a sure indication it was a restriction. Normally, we like to see somewhere between 0.8 to 1.0 in-Hg on a hot street car. Four-barrel carbs are factory-rated at 1.5 in-Hg, so the math tells us we'd be pretty close to ideal with a carb officially rated at around 950 cfm (which is available in a standard 4150-flange from Quick Fuel).

The engine was also tested with race fuel. According to Brandes, "It made no more peak power and maybe just 5 to 6 lb-ft of additional torque, but because race gas burns slower, it took 2 to 3 degrees more total timing to achieve this, going from 34 to 36 degrees. This says to me

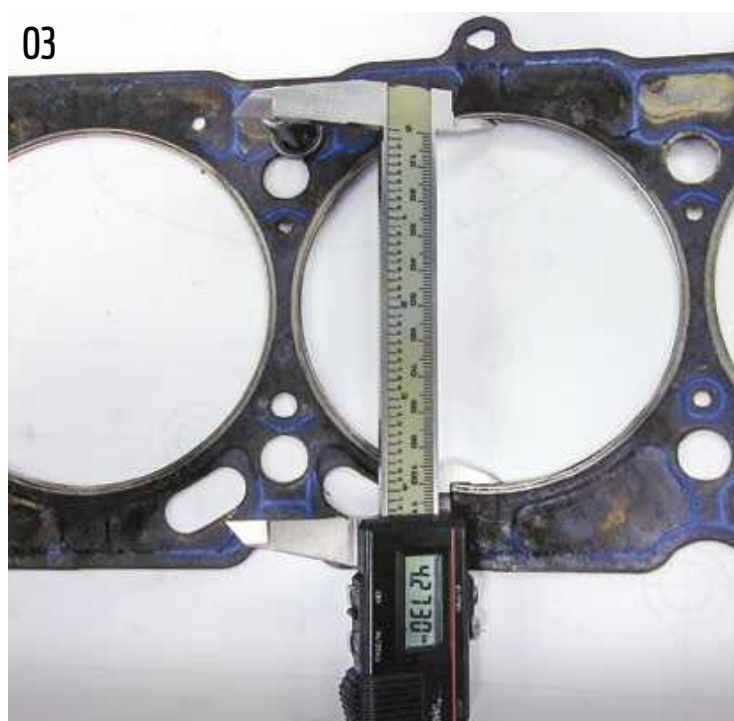
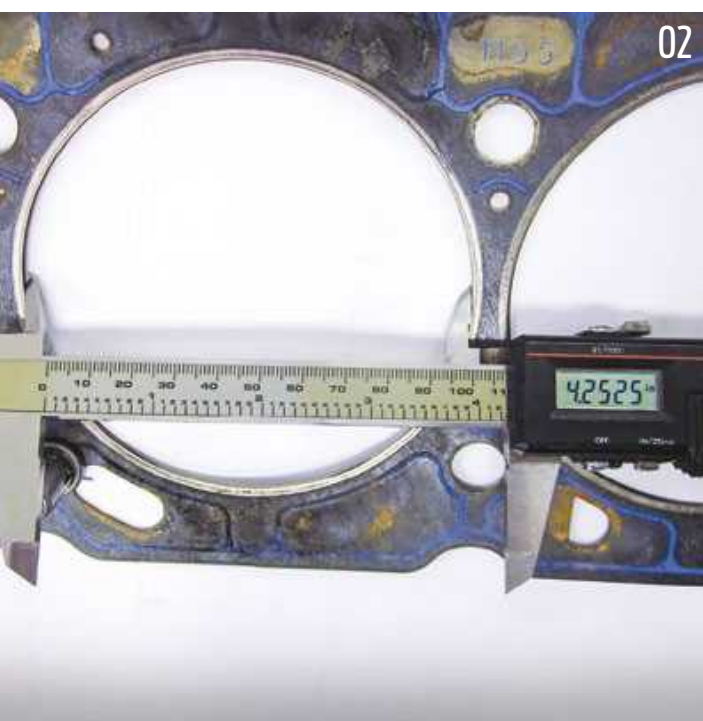
the engine is not octane-limited, even at slightly over 11:1 static compression."

Once off the dyno, Brandes tore the engine apart for a second inspection. "There were absolutely no more signs of gas-ket distress, and the bottom end appears stable, with a slight but normal wear pattern."

LESSONS LEARNED

There's been lots of chatter on Olds Internet forums since the June article, with a bunch of self-proclaimed Olds "experts" insisting how all this can't work. We'd like to address three most-heard criticisms:

- *With just four head bolts per cylinder, conventional head gaskets won't hold up on a high-power, high-compression, pump-gas Olds. This build proves that a more sophisti-*



01 The girdle is now fully in place with all machining completed. Van Vleet's Milodon oil pan cleared. Some Olds racers have reputedly used production caps and girdles like this up to the 900hp level with satisfactory results.

02-03 Fel-Pro engineers measured the head gaskets for thickness and bore-opening size. The gaskets were compressed 0.001–0.0015 inch less than expected. The gasket bore openings were found to be stretched about 0.020 inch in the intake-to-exhaust direction. The diagnosis was insufficient clamp load plus possible detonation.



04 Analyzing the clamp-load problem in its engineering lab, Fel-Pro tested the engine's ARP head studs in a load cell, measuring bolt stretch under different torque loads with a transducer. Every alloy, fastener length, and fastener diameter combo has an optimum stretch value that develops its maximum strength without getting into yield (permanent elongation).

05 The trick GE "BoltMike" measures fastener length before and after tightening with an ultrasonic pulse. The time it takes for the pulse to return to the sensor equates to the length. If you have the bucks, this permits checking the stretch of even blind fasteners. It's like sonar, but for a fastener.

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01



02



03



04



cated head-gasket tightening procedure works, assuming you have properly calibrated torque wrenches and know what you are doing. A similar procedure should enhance head-gasket reliability on other marginally sealing engines without taking the jump to O-rings or other expensive higher-end solutions.

- *An 11:1 engine won't live running on pump premium unleaded gas.* On the contrary, Brandes routinely builds many makes of conventional muscle-car style engines to this level or even higher with modern aluminum heads, minimal (approximately 0.040 inch) quench, the right cam timing, and careful tuning. In fact, HOT ROD is considering putting one of these high-compression Brandes motors into an old-school car, then driving it coast-to-coast.
- *Big-block Olds V8s need large bearing clearances and*

full-groove mains. That's old-school thinking, left over from now-obsolete OE specs. "When these engines were designed a half-century ago," Brandes explains, "the quality of machining and the lubricant quality was limited. The plan is to keep oil downstairs where it's needed. This engine has Mondello oil restrictors and good machining practice. The bearing clearances are in line with Mondello's own tech manual and it flat works." Van Vleet's four previous engines that failed all used big clearances and fully grooved bearings.

Technology is in a continuous state of flux and evolution. An engine doesn't care what name is on the valve covers; there's no reason why modern tech theory can't be incorporated into classic engines. As Brandes says, "When your tribal knowledge is getting old, maybe it's time to get a new chief."

01] A zero is added to the number shown on the display, so the actual bolt load being generated here is 8,070 psi. From these tests, Fel-Pro determined that torque could safely be raised from ARP's default 80 lb-ft value to 90 lb-ft.

02] To get to the higher final torque value, Fel-Pro recommended tightening the fasteners in three or four incremental steps. "Each step should be at least 15 lb-ft." Although ARP's published torque values were determined to be conservative in this instance, be sure your torque wrench is accurate and properly calibrated.

03-04] Fasteners and gaskets relax after initial torquing, so Fel-Pro advised letting the assembly sit three to four hours (or, better yet, overnight). Then fully loosen and then retighten each head stud nut individually, one at a time, back to 90 lb-ft following the standard OE tightening pattern. Doing this on each fastener individually won't disturb the gasket seal. Here, the white paint indicates the additional nut rotation needed to achieve 90 lb-ft on the post-relaxation retorque (04, compared to its initial position, 03).

05] Back on the dyno for the second time, the crew played with different jets and air bleeds. No major adjustments were needed on Quick Fuel's 830-cfm carb. However, on the top-end the carb was "pulling vacuum," indicating that a larger carb could be worth top-end power.

06] Advanced Engine Concepts' Dan Timm adjusts the timing during the retest. This time out, the engine ran best at 34 degrees total, with a slightly lazier centrifugal-advance curve on the bottom end. An ignition break-up problem was cured by narrowing the spark plug gap.

05



06



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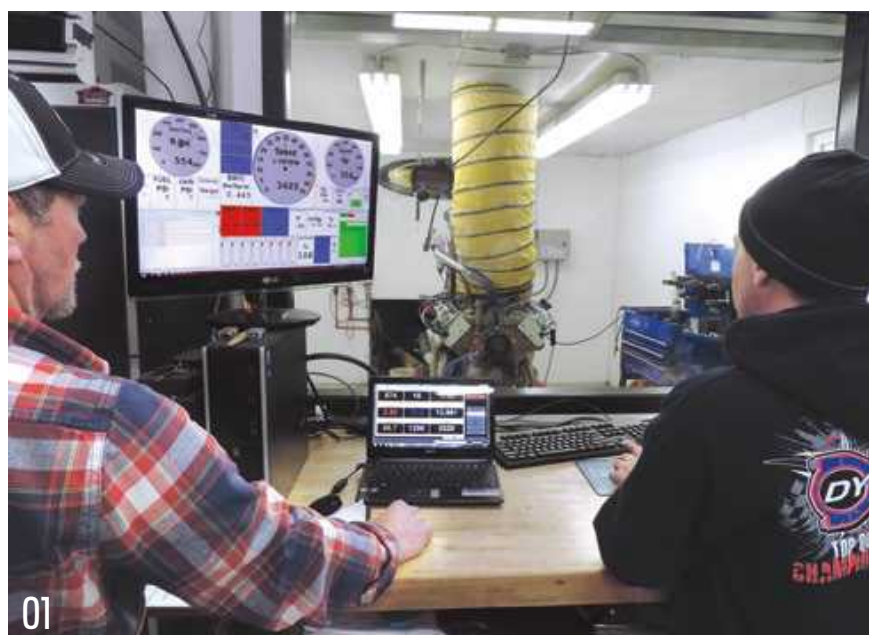
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01



02



04

Contacts

ADVANCE ENGINE CONCEPTS (AEC); Green Lake, WI; 920.294.0474; AdEngine.co

AUTOMOTIVE RACING PRODUCTS INC. (ARP); Ventura, CA; 800.826.3045 or 805.339.2200; ARP-bolts.com

BHJ PRODUCTS INC.; Union City, CA; 510.797.6780; BHJinc.com

DIAMOND PISTONS; Clinton Twp., MI; 877.552.2112; DiamondRacing.net

FEL-PRO—SPEED-PRO (FEDERAL-MOGUL CORP.); Southfield, MI; 800.325.8886; FMe-cat.com

MONDELLO PERFORMANCE PRODUCTS INC.; Paso Robles, CA; 805.237.8808; MondelloTwister.com

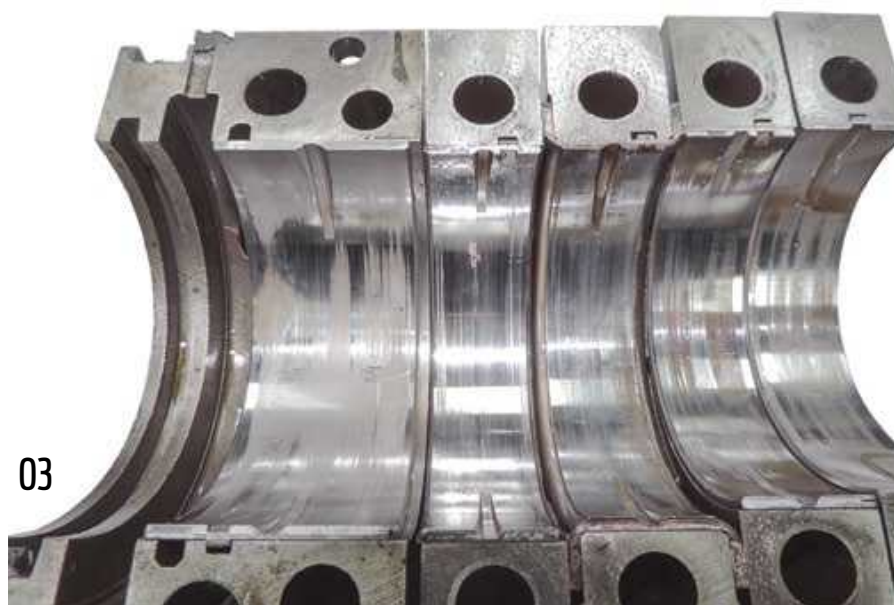
QUICK FUEL TECHNOLOGY (QFT); Bowling Green, KY; 270.793.0900; QuickFuelTechnology.com

WESTECH AUTOMOTIVE; Silver Lake, WI; 262.889.4346; WestechAuto.com

01] The second time out, the engine made 524 hp and 592 lb-ft, virtually the same peaks as before, albeit 100-rpm lower. However, average output and torque were up slightly.

DYNO RESULTS SUMMARY

	PHASE 1 (NO GIRDLE)	PHASE 2 (GIRDLE)	CHANGE
Max torque (lb-ft) @ rpm	590.9 @ 4,000	591.8 @ 3,900	+0.9
Max power (hp) @ rpm	525.3 @ 5,200	524.2 @ 5,100	-1.2
Avg. torque (lb-ft) @ 3,000–5,800 rpm	550.6	555.4	+4.8
Avg. power (hp) @ 3,000–5,800 rpm	456.3	460.0	+3.7



03



05

02] After the second test session incorporating the new girdle and head-gasket tightening procedure, Brandes tore the end apart again for inspection. Things were looking good. Rear clearance changes were now under 0.0003-inch max; Brandes calls that “normal break-in stabilization.”

03] For the most part, the original coating on the bearings wasn't even disturbed. You can still see the ball impression from the bore check gauge.

04] The combustion chambers were uniformly gray, again indicating a nice, even, complete burn. Leakdown on all cylinders was back under 1 percent.

05] Head gasket looks good, too! Now back in Van Vleet's Olds, the engine is being driven daily during the Summer cruise season. No runs, no drips, no errors.

PHASE 2 PARTS AND PRICES

Includes the major parts required to fix the problem. Shop labor and machining are listed only if they cannot typically be performed by the average home mechanic. Does not include parts reused from Van Vleet's original (pre-rescue) failed engine, shipping charges, sales taxes, or miscellaneous small bolts, hardware, and plumbing. The values listed here represent the parts and machining operations needed to “perfect” the engine added to the cost of the original June 2015 rescue build (Phase 1), minus any parts no longer needed from the Phase 1 build. Phase 2 priced 06/10/2015 and subject to change.

BRAND	PART DESCRIPTION	PART NO.	PRICE	
			SOURCE	COST
MONDELLO	GIRDLE, main bearing cap support, Halo design, Olds V8, includes mounting hardware	SG-490	Mondello	\$399.00
WESTECH	MACHINING & MEASURING OPERATION, block and main caps, main girdle install (square-up valley bulkheads, cap registers, and tops of caps; line-bore block; check and correct girdle to rotating assembly and oil pump clearances)	Labor	Westech	\$550.00
	MACHINING OPERATION, replace valvetrains, freshen valve job (includes labor and guides)	Labor	Westech	\$450.00
			SUBTOTAL (A)	\$1,399.00
			PHASE 1, total parts and labor (June 2015) (B)	\$11,686.01
			SUBTRACT, ARP main stud kit (longer stud kit is included with Mondello girdle) (C)	-\$74.53
			NEW TOTAL (A+B-C)	\$13,010.48



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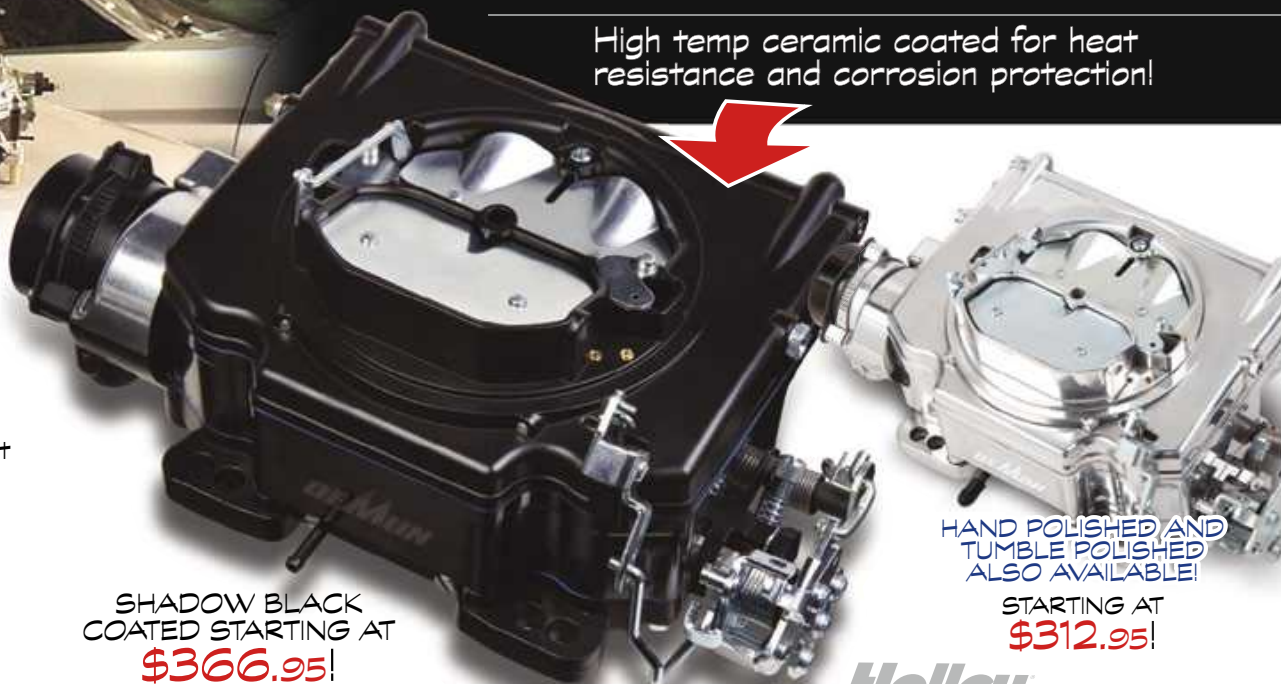
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Roger Gipp From Milwaukee, Wisconsin Asks...

What Might Cause Valvetrain Noise on 1966 396 and 1977 454 Big-Block Chevys?

✍ Marlan Davis

Q:

I rebuilt a 1966 396 Chevy big-block, and then a 1977 454. Each engine had the blocks bored for new forged pistons. Both used the stock crank and rods, standard main and rod bearings, new cam bearings, and refurbished stock heads with stock valvesprings. They had a new Edelbrock Performer-Plus cam and lifters, a new high-volume oil pump, a Performer intake manifold, and a stock HEI distributor.

After starting the first 396 fresh engine and letting it run to break in, the lifters kept making noise as if they never pumped up. I pulled the valve covers off and noticed the oil coming out of the rocker arms was only trickling out.

I then pulled that engine out of the car and started fresh with the 454 and had the same results. Next, I dropped the oil pan on the 454 and tried a new stock-pressure oil pump with the same results. Next, I tried another set of new lifters, same result. I also tried different valve-lash adjustments with very little difference in the results. Do you have any advice on any other problem that there might be?

A:

Why the cam failed in the early 396 is a no-brainer for a Chevy old-timer like me, but I had to consult with Jim Burlison at Dougan's Engine & Machine, Joe Sherman at Joe Sherman Racing, Kevin McClellan at K&N Racing, Norm Brandes at Westech Automotive, and Steve Brulé and Rick Stoner at Westech Performance for some serious head-scratching on the 454 problems. Like most modern big-block Chevy aftermarket grinds, the Edelbrock cam won't fit early 1965–1966 big-block Chevys like your 396 (as stated in Edelbrock's catalog). For proper lifter galley and upper-end oiling, these early model Rat motors must run a cam with a grooved rear journal that mates with the early style grooved rear cam bearing that has three oil holes: two 0.250-inch holes and one 0.313-inch hole. The other four bearings are not grooved and have only a single 0.116-inch oil hole. Dura-Bond sells the early cam bearing set under its PN CH9A; the Speed-Pro/Federal-Mogul PN is 1404M. Nowadays performance cams with grooved rear



© Marlan Davis

[The 1965–1966 big-block Chevys require a cam with a groove in the rear journal, plus a corresponding grooved rear cam bearing with three oil holes. Major cam companies still offer the cams on a special-order basis. Comp Cams, for example, charges \$35 more than its normal price for the particular cam in question; add labor operation PN 1-119-1 to the cam's normal part number.]

journals must be special-ordered from the big cam companies.

There is one more thing readers need to watch out for on earlier Chevy V8s, although—with your stated later-model, large-cap HEI distributor—this tidbit doesn't specifically apply to you. Prior to the mid-1960s, some original-equipment, small-cap, early Chevy distributors had only a partial groove around the bottom of the housing. Later stock, replacement, and aftermarket distributors have a full, 360-degree groove. This groove directs oil to the lifter galleys. The partially grooved distributor must be installed so the groove faces toward the cam or the lifters and upper valvetrain won't get oil. On distributors with a vacuum can, it's hard to screw this up, since the vacuum can orientation more or less dictates how the distributor will drop in and still clear the intake manifold's runners. However, some GM dual-point distributors had a partial groove and no vacuum can, so it is at least theoretically possible to install them "backward."

Orientation isn't critical on the full-groove distributors, which replace the partial-groove units with no problems. You can also use the partial-groove distributor in later Chevys provided proper groove orientation is maintained.

So what about your later 454? Beginning in 1967, on a big-block Chevy, the lifters are oiled through an annulus groove behind the rear cam bearing. A grooved rear bearing isn't used and all five bearings have the single 0.116-inch hole. Not that you see them around much these days, but an early grooved cam can be used in a 1967-and-later block, provided you use the proper 1967-and-later cam bearing set without the grooved rear bearing (Dura-Bond set PN CH12, Speed-Pro/Federal-Mogul PN 2101M, or equivalent).

However, using an early grooved rear cam bearing in a 1967-and-later block with either an early or late cam will excessively open up the oil clearances, causing some oil loss and once again starving the cam galleys and lifters.

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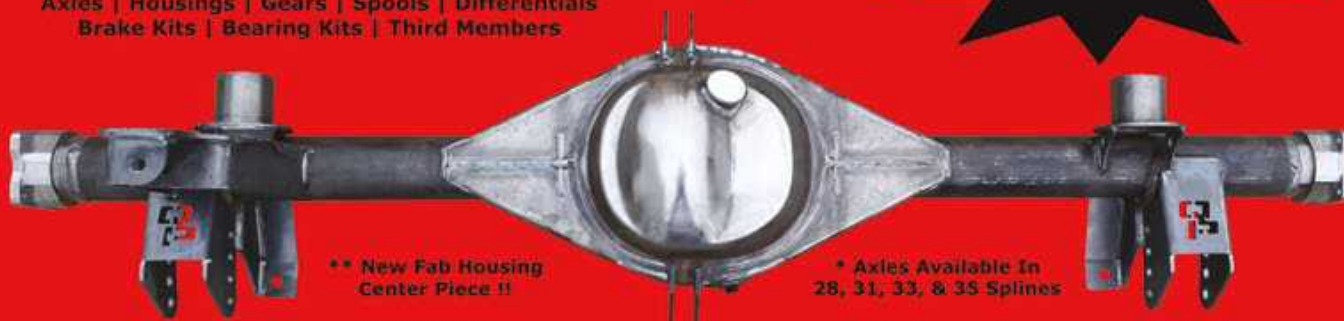
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Assuming you did not install the early grooved rear cam bearing in the 454 build, we need to look further to find what's causing the 454's noisy lifters. If I'm reading your message correctly, you indicate that on the 454, you (properly) started fresh with another all-new cam and lifters. If I read that wrong and you did reuse the cam and/or lifters from the previous engine, that's where the problem lies: They were already toast from the previous starvation issues.

Assuming you lunched yet another brand-new cam and lifters in the 454, then again experienced a noisy valvetrain, installing yet another set of new lifters wouldn't help if one or more cam lobes had already failed (check the lift with a dial indicator).

Hopefully, you didn't reuse any of the upper valvetrain parts from the 396 build, either. There's a good chance that at least several of the rocker arms and balls got burnt when the first failure occurred (look for bluing or discoloration on the rockers and balls).

Moving on, check that no oil-galley plugs are missing. In particular, are the two small pipe plugs that seal the lifter galleys in the front present? Sometimes overlooked, they're hidden behind the front upper timing chain sprocket. Also note that GM started drilling small vent holes in those front plugs sometime in the 1980s. Highly recommended for any big-block, the tiny vent holes help fight lifter clatter by bleeding air out of the lifter galleys, and they also provide additional timing-chain lubrication. Pioneer offers the vented plugs under PN PP-454 (two required).

Also be sure that oil restrictors are not installed in the opposite end of the cam-galley holes at the rear of the block. Restrictors should only be used to restrict upper-end oil on mechanical roller cams and full roller-rocker valvetrains—and even they have fallen out of favor with some racers as current high-end theory stresses the need to keep professional-racing-level humongous valvesprings alive by effectively using circulating engine oil as a cooling medium.

Still no joy? At this point, you need to start checking and qualifying the entire oil supply system. Install an oil pressure gauge. Remove the cam from the engine and use a prepriming tool to spin the oil pump over until (hopefully) oil pressure maxes out (Powerhouse Products PN POW101150 is one source; it includes a bushing to properly pressurize the upper valvetrain). Assuming proper oil pressure, check to see that oil is present and squirting at all the cam journals. If all journals are getting oil, measure the lifter-body diameter and the lifter-bore diameter clearance. The difference between the two is the lifter-bore clearance; anything over 0.0015 inch is excessive. If clearance is OK, make sure the pushrods are drilled straight through and unclogged (can you see daylight through them?). Also measure the diameter of the cam journal OD versus the cam bearing ID—you want to see 0.0005–0.0031 inch clearance here.

If one or more cam journals aren't getting oil, first make sure the cam-bearing oil holes are



© Steve Brulé



[The lower housing groove directs oil into the lifter galleys and upper valvetrain. If somehow you install a partial-groove distributor backward, the upper valvetrain won't get any oil.]

aligned with the holes in the oil journals. If they are aligned, check the corresponding bottom-end (main and rod) bearing clearances. On a mild street big-block, generally you want to see clearances of 0.002–0.003 inch on the main bearings, and 0.0015–0.0025 inch on the rods—but you can slide by up to 0.003. If the main bearing clearances are OK, check the clearance between the oil pump pickup screen and the pan floor—shoot for $\frac{3}{8}$ – $\frac{1}{2}$ inch.

If all of the above checks out, at this point you'll have to bite the bullet and completely tear down the engine. Rifle-brush every internal oil passage. Moroso offers a universal rifle-brush clean-out set under PN 61820. Keep flushing the block with solvent and shop air until every passage is completely clean and blows through end to end.

Finally, don't forget flat-tappet cam break-in procedure is critical today. Modern "starburst-symbol" motor oils you're likely to find at the average auto parts store lack the proper ZDDP (zinc) additives needed to keep performance flat-tappet cams alive. Next time you put in a flat-tappet cam, be sure to use a good break-in oil with high ZDDP content, such as Lucas' 20W-50 High-Zinc Engine Break-in Oil. Run the engine in at 1,500–2,500 rpm for at least 20 minutes. Don't let it idle. Most cam-lobe failures occur within the first minute or so of engine operation. After running the engine in, change the oil and filter. I recommend high-ZDDP-content oil even after break-in when running a flat-tappet cam. If on a budget, big-truck diesel

oil such as Shell Rotella is one affordable solution. Good luck.

Contacts

COMP CAMS; Memphis, TN; 800.999.0853 or 901.795.2400; CompCams.com

DOUGAN'S RACING ENGINES; Riverside, CA; 951.681.1961; DougansRacing.com

DURA-BOND BEARING CO.; Carson City, NV; 775.883.8898; Dura-BondBearing.com

EDELBROCK LLC; Torrance, CA; 800.416.8628 (tech) or 310.781.2222 (general); Edelbrock.com

JOE SHERMAN RACING; Santa Ana, CA; 714.542.0515; JoeShermanRacing.com

K&N ENGINEERING INC.; Riverside, CA; 800.858.3333 or 951.826.4000; KNfilters.com

LUCAS OIL PRODUCTS INC.; Corona, CA; 800.342.2512 or 951.270.0154; LucasOil.com

MOROSO PERFORMANCE PRODUCTS; Guilford, CT; 203.4534.6571 (general) or 203.458.0542 (tech); Moroso.com

PIONEER AUTOMOTIVE; Meridian, MS; 601.483.5211; PioneerAutoInc.com

POWERHOUSE PRODUCTS; Memphis, TN; 800.872.7223; PowerhouseProducts.com

SHELL ROTELLA; Houston, TX; 800.237.8645; Shell.com/rotella

SPEED-PRO (FEDERAL-MOGUL CORP.); Southfield, MI; 800.325.8886; FMe-cat.com

WESTECH AUTOMOTIVE; Silver Lake, WI; 262.889.4346; WestechAuto.com

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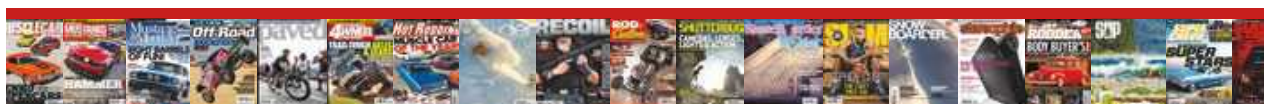
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Power Tour: Finally, a Vacation



I was part of the magazine team that created HOT ROD Power Tour 20 years ago. I have a vague recollection that I might have named it, though the whole thing must be credited to a collaboration of the staffers of the time: Jim Savas, Steve Campbell, Drew Hardin, Gray Baskerville, Jeff Smith, Cole Quinnell, Rob Kinnan, and Will Handzel. As the oft-told story goes, Power Tour germinated as a cross-country trip for the staff, with readers invited to tag along. I took my Cheap Thrills Dart on the first one, making it from LA to Cedar City, Utah, before the transmission gave up, then I hitched rides with the other HOT ROD project cars on the trip: the Crusher Camaro (there's still a chip in the passenger door where I bounced my camera while shooting car-to-car photos), Baskerville's 1932, Smith's 1965 Chevelle, Quinnell's 1968 Nova, Kinnan's yellow 1967 Fairlane that was on a paint-and-body cover, and Handzel's Budget Beater Model A roadster. Vic and Nancy Edelbrock took their 1940 Ford, and by now they might be the only people to have attended every single Tour. The first several events blur together in my mind, but it's a stew of great memories of genuine camaraderie and fun. In short time, we watched Power Tour go from a lighthearted cruise of a couple dozen cars to an event with enough cars to drain gas stations out of gas. That was when we learned to stop having prescribed fueling stops.

I returned to HOT ROD in 2001 to a very different kind of

Power Tour—one of massive proportion (though, in retrospect, still dinky compared with the scene today). My role had shifted to editor-in-chief, totally focusing on coverage while somewhat overseeing operations (though, through several management changes, Jenny Schmitz and Michelle Turczyn have really made it happen). For 13 years, my Power Tour experience has been riding with photographer Wes Allison and making photos and stories happen. Every year, people expectantly asked what kind of incredible hot rod I was driving on Tour. Answer: a spankin' new Chevrolet Tahoe or Suburban. The coverage demands ramped ever upward in the face of new media platforms, and frankly, Power Tour became little more than a stress.

That changed in 2015, and it was like 1995 all over again, yet with literally 2,000 times the number of participants. With David Kennedy and staff no longer in need of my editorial services, Mike Finnegan and I went along to do nothing but promote our *Roadkill* video series. We drove several of our project cars along the way: the MSD Atomic van, the Draguar (1974 Jag XJ12 with a blown 383ci Chevy), and the Blasphemi (Finnegan's Hemi-powered 1955 Chevy Gasser). I snapped nary a pic. We did nothing but mingle—once again discovering that Power Tour is like nothing else on Earth. I'm glad we thought of it.

➔ HOTROD.COM/David-Freiburger

[One of our rides was the MSD Atomic van, a 1973 Chevy shortie that was built on the *HOT ROD Garage* YouTube show. It's stuffed with a Lingenfelter LS7 that had 630 hp before we choked it with lousy manifold and side pipes. It also has a Gearstar 4L80E and a Moser 9-inch rear end with 3.73s. On street tires, it ran 13.50s in brutal Memphis heat and humidity and did violent burnouts.



BEHIND THE SCENES

There's a new HOT ROD show coming to YouTube! It's *Engine Masters*, presented by Amsoil. We'll be dyno-proving one speed part per episode. Look for it around late November 2015.

Roadkill.com is live! Check it out. Around the time this issue goes on sale, we'll be doing coverage from our *Roadkill Takes America* cross-country trip where fans are invited to come along. Hmm...smacks of Power Tour 1995.

HOTROD.com continue to grow wildly, with a solid two-million-plus visitors a month and 14 million page views.

I think Elana did not acquire an old Dodge truck this month, which is a first for quite some time.

Car I Most Wanted to Build on the Day I Wrote This Remember my 440-powered Crop Duster I shared in this column two months ago? Shockingly, I'm still actively working on it. Or at least Steve Dulcich is. Somehow, installing a new interior turned into pulling the engine out to re-piston it. Cuz, you know, how do you expect me to drive something with 8.5:1 compression?

Best Instagram Pic This Month



[This really isn't the best Instagram pic this month, but I'm using it here so I can brag on my 1932 Ford that's making progress at Circle City Hot Rods. It's gonna be an H&H Flatheads—powered race car for El Mirage and Bonneville.

Coming Next Month: Power Tour 2015

COMING 09.04.15

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